

SCEPTREPLUS

Final Trial Report

Trial code:	SP
Title:	Tomato: Screening insecticide/biopesticide products for management of <i>Macrolophus pygmaeus</i>
Crop	Group: Protected Crops - Tomatoes
Target	<i>Macrolophus pygmaeus</i>
Lead researcher:	Rosemary Collier
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Period:	November 2021 – September 2022
Report date:	5 September 2022
Report author:	Andrew Jukes and Rosemary Collier
ORETO Number: (certificate should be attached)	381

I the undersigned, hereby declare that the work was performed according to the procedures herein described and that this report is an accurate and faithful record of the results obtained.

5 September 2022



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Date

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Authors signature

Trial Summary

Introduction

Macrolophus pygmaeus was first released in UK tomato crops in the mid-1990s to control glasshouse whiteflies. However, it soon became apparent that it damaged tomato plants (Hayman & Jacobson, 1996) and significantly reduced yield by causing premature flower / fruit drop (Sampson & Jacobson, 1999). *Macrolophus pygmaeus* became the most important pest of organic tomatoes in the UK, with losses in vine-ripened cherry tomatoes being particularly serious (Jacobson, 2001). By 2005, a method of monitoring *Macrolophus* populations in commercial crops had been developed to help determine the optimum time for treatment (Jacobson & Morley, 2006) and a remedial treatment based on natural pyrethrins had been found to be successful (Jacobson & Morley, 2006a). Agropharm / HDC obtained a SOLA for Pyrethrum 5EC, which contains natural pyrethrins and the synergist, PBO. There was little doubt that *Macrolophus* can make a useful contribution to IPM in tomato if populations can be managed to avoid plant damage. This can be achieved by timely applications of Pyrethrum 5EC to specific parts of the crop canopy (Jacobson & Morley, 2007). *Macrolophus*-based strategies were developed to optimise control of tomato leafminer (*Liriomyza bryoniae*) with incidental benefits against other pests (Jacobson, 2010).

When the extremely damaging leaf / fruit mining pest, *Tuta absoluta*, arrived in the UK, *Macrolophus* became the main component of the new IPM programme (Jacobson, 2011; Jacobson, 2013; Jacobson, 2014). Since then, the main thrust of R&D on this predator has been to enhance its speed of establishment (Jacobson & Howlett, 2014a; Jacobson & Howlett, 2015) as well ensuring that it is compatible with all other PPPs used in the tomato IPM programme (Jacobson, 2018). It is now vital that any new control measures take all the above factors into account or the solution to *Macrolophus* damage will simply give rise to another serious problem. The aim of this study was to identify an alternative/additional treatment to natural pyrethrins for managing populations of the predatory bug *Macrolophus pygmaeus* in UK greenhouse tomato crops and to identify products that might also be used to manage *Nesidiocoris*

Methods

Batches of *M. pygmaeus* adults and nymphs were assessed separately. Insects were used immediately upon receipt or stored at 5°C and used within one day.

Treatments were prepared in 1000 l/ha solutions and were applied using an air powered spray apparatus (Potter Tower) at a rate of 200 l/ha. Five replicates of each treatment were sprayed either topically over the insects or to Petri dishes before the introduction of insects. In all cases, a shelter (to mitigate cannibalism), food (*Ephestia spp.* eggs) and moisture (a soaked cotton pad) were placed in the Petri dish with the *M. pygmaeus*. Five *M. Pygmaeus* were added to each test dish.

The test dishes were incubated in an illuminated incubator maintained at a constant 20 ± 2°C with a 16 hour light (400-800 lux) and 8 hour dark cycle. Mortality was recorded approximately 1 hour after treatment, 1 day after treatment, and then on two subsequent occasions up to 7 days post-treatment.

Results

The mean survival time (MST) of 50% of the population from Kaplan-Meier analyses for the control insects (water only spray) varied between 84 and 147 hours (3.5 – 6 days) with the adults and 139 to 164 hours (6 – 7 days) with the nymphs. This suggests that within the insect batches tested adults were on average less long-lived than nymphs. Also, when considering topical application, MST for Pyrethrum 5EC varied between 1 and 18 hours for adults and 1 and 116 hours for nymphs. This suggests that nymphs are also more difficult to kill than adults. Both observations would also indicate that there is considerable variability between batches in terms of both general health and ability to withstand insecticide application. In comparison the surface residue application gave MSTs of 14 – 99 hours (adults) and 16 – 86 hours (nymphs) indicating that surface residues are generally less effective than direct contact.

Pyrethrum 5EC is the most effective treatment (lowest MST and highest HR) and Spruzit was the only other treatment which offered any consistent levels of control (MST for topical application 35 – 75 adults and 21 – 103 nymphs).

Conclusion

There is considerable variation between batches of *M. pygmaeus*. Nymphs live longer than adults and are more resistant to chemical application. None of the test treatments were as effective as the standard Pyrethrum 5EC but Spruzit offers similar levels of mortality. Direct contact is more effective than contact with surface residues.

A further aim of the study was to determine whether there was anything that might be evaluated further for control of *Nesidiocoris tenuis* on tomato. It is likely that products that are effective against *M. pygmaeus* would also be effective against *N. tenuis*. Thus, it is reasonable to assume that only Pyrethrum 5EC and Spruzit would have activity against *N. tenuis*. There is no opportunity to pursue this further with AHDB funding.

Take home message:

Pyrethrum 5EC is an effective product for control of *M. pygmaeus*. Spruzit would be a reasonable alternative if less mortality is required but it contains the same active ingredient (pyrethrins) as Pyrethrum 5EC. None of the other products tested would appear to be viable replacements for the current standard product.

References

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Introduction

The objectives in the proposal submitted to the AHDB were as follows:

Objective 1. Identify products (insecticides or bioinsecticides) that might be used to manage *Macrolophus* populations in tomato.

This was done through discussion with Rob Jacobson, Phil Morley and Joe Martin.

Objective 2. Undertake small-scale laboratory tests to determine the efficacy and persistence of treatments that might be used to cull *Macrolophus* populations.

This is described in the report below.

Objective 3. Depending upon the outcome of the small-scale laboratory tests, design a programme for evaluating the performance of the product(s) identified in a commercial situation. *We propose that if further work is needed for evaluation in a commercial situation then we submit a new proposal. It is impossible to estimate at this stage what the costs for this might be.*

There is no opportunity to pursue this further with AHDB funding.

Objective 4. Depending upon the outcome of the small-scale laboratory tests on *Macrolophus*, determine whether it is necessary to undertake similar small-scale tests on *Nesidiocoris tenuis*. *We propose that if further work is needed then we submit a new proposal.*

There is no opportunity to pursue this further with AHDB funding.

Objective 5. Complete report on laboratory tests on *Macrolophus* and submit to AHDB

Objective 6. Communicate findings to tomato growers.

A suitable meeting will be identified and the results will be presented in a webinar that is planned to disseminate the results from all the SCEPTREplus trials on edible protected crops.

Objective of trial

1. To identify an alternative/additional treatment to natural pyrethrins for managing populations of the predatory bug *Macrolophus pygmaeus* in UK greenhouse tomato crops and to identify products that might also be used to manage *Nesidiocoris*

Trial conduct

UK regulatory guidelines were followed but EPPO guidelines took precedence. The following EPPO guidelines were followed:

Relevant EPPO guideline(s)		Variation from EPPO
PP 1/152(3)	Design and analysis of efficacy evaluation trials	None
PP 1/135(3)	Phytotoxicity assessment	None
PP 1/181(3)	Conduct and reporting of efficacy evaluation trials including GEP	None

There were no deviations from EPPO guidance:

Test site

Item	Details
Location address	University of Warwick Wellesbourne Campus Wellesbourne Warwick CV35 9EF
Crop	None
Cultivar	n/a
Soil or substrate type	n/a
Agronomic practice	n/a
Prior history of site	n/a

Trial design

Item	Details
Trial design:	5 x batches
Number of replicates:	5
Row spacing:	n/a
Plot size: (w x l)	n/a
Plot size: (m ²)	n/a
Number of plants per plot:	n/a
<i>Leaf Wall Area calculations</i>	n/a

Treatment details

AHDB Code	Active substance	Product name/ manufacturer code	Formulation batch number	Content of active substance in product	Formulation type	Adjuvant
Untreated						
Not needed	Pyrethrins	Pyretrum 5EC	191123	5% w/v ¹	EC	None
Not needed	Pyrethrins	Spruzit	364499	4.59 g/l	EC	None
AHDB9967	NA	NA	NA	NA	NA	None
AHDB9735	NA	NA	NA	NA	NA	None
AHDB9971	NA	NA	NA	NA	NA	None
AHDB9736	NA	NA	NA	NA	NA	None

All products are Bioinsecticides

¹ Also contains piperonyl butoxide (synergist) at 25% w/v

Application schedule

Treatment number	Treatment: product name or AHDB code	Rate of active substance (ml or g a.s./ha) ¹	Rate of product (l or kg/ha)	Application code
1	Control			
2	Pyrethrum 5EC	32.5 (6.5)	0.65 l	A B
3	Spruzit	55.1 (11.0)	12 l	A B
4	AHDB9967	-	-	A B
5	AHDB9735	-	-	A B
6	AHDB9971	-	-	A B
7	AHDB9736	-	-	A B

¹ Dilution at 1000 l/ha. Application at 200 l/ha gives the values in brackets

Application details

	Application A (Topical application)	Application B (Surface residue)
Application date	Batch 1 Adult - 18/11/21 Batch 3 Adult - 16/12/21 Batch 4 Adult - 13/1/22 Batch 5 Adult - 2/2/22 Batch 6 Adult - 2/3/22 Batch 7 Nymph - 15/12/21 Batch 8 Nymph - 20/1/22 Batch 9 Nymph - 21/1/22 Batch 10 Nymph - 10/2/22 Batch 11 Nymph - 7/3/22	Batch 2 Adult - 7/12/21 Batch 3 Adult - 15/12/21 Batch 4 Adult - 13/1/22 Batch 5 Adult - 3/2/22 Batch 7 Nymph - 14/12/21 Batch 8 Nymph - 20/1/22 Batch 9 Nymph - 21/1/22 Batch 10 Nymph - 10/2/22 Batch 11 Nymph - 7/3/22
Time of day	n/a	n/a
Crop growth stage (Max, min average BBCH)	n/a	n/a
Crop height (cm)	n/a	n/a
Crop coverage (%)	n/a	n/a
Application Method	Spray	Spray
Application Placement	Insect	Petri dish
Application equipment	Potter Tower	
Nozzle pressure	10 psi	
Nozzle type	Open tube	
Nozzle size	2 mm	
Application water volume/ha	200 l ¹	
Temperature of air - shade (°C)	20 (room temperature)	
Relative humidity (%)	n/a	n/a
Wind speed range (m/s)	n/a	n/a
Dew presence (Y/N)	n/a	n/a
Temperature of soil - 2-5 cm (°C)	n/a	n/a
Wetness of soil - 2-5 cm	n/a	n/a
Cloud cover (%)	n/a	n/a

¹ Solutions diluted in 1000 l/ha

Untreated levels of pests/pathogens at application and through the assessment period

Common name	Scientific Name	EPPO Code	Infestation level pre-application	Infestation level at start of assessment period	Infestation level at end of assessment period
	<i>Macrolophus pygmaeus</i>	MACLNU	5 beetles/dish	5 beetles/dish	5 beetles/dish

Methods

Batches of *M. pygmaeus* adults and nymphs (6 x adults and 5 x nymphs) were ordered as normal commercial products from Fargo and were assessed separately. Insects were used immediately upon receipt or stored at 5°C and used within one day. Health and general physical condition of the insects was assessed prior to use.

Spray application

Treatments were prepared in 1000 l/ha solutions and were applied using an air powered spray apparatus (Potter Tower) at a rate of 200 l/ha. Percentage deposition onto a 59 cm² Petri dish was calculated at 4.4%. Therefore, to achieve 200 l/ha, 2.75 ml of each test solution was sprayed onto each target. Five replicates of each treatment were sprayed.

Surface residue application

Treatments were applied as described to circular plastic Petri dishes (approximately 59 cm² surface area). A shelter (to mitigate cannibalism), food (*Ephestia spp.* eggs) and moisture (a soaked cotton pad) were placed in the Petri dish prior to introduction of *M. pygmaeus* in all treatments. Five *M. Pygmaeus* were added to each test dish.

Topical application

Five *M. Pygmaeus* were added to each test dish and then chilled over ice to minimise insect movement. Treatments were applied as described over the insects. A shelter (to mitigate cannibalism), food (*Ephestia spp.* eggs) and moisture (a soaked cotton pad) were placed in the Petri dish after treatment.

Incubation and assessment

The test dishes were incubated in an illuminated incubator maintained at a constant 20 ± 2°C with a 16 hour light (400-800 lux) and 8 hour dark cycle. Mortality was recorded approximately 1 hour after treatment, 1 day after treatment, and then on two subsequent occasions up to 7 days post-treatment.

Statistical analysis

The statistical package SPSS (IBM) was used for all analyses.

Mortality over time was analysed by comparing the risk of death (hazard) in each group. A Cox proportional hazard model was used to compare the treated groups with the water control group. The resulting hazard ratios represent the individual's relative risk of death compared to the water control group. The LT₅₀ values (time at which 50% mortality) occurred) for each group were calculated with a Kaplan-Meier analysis. Differences between treatments were assessed with pair-wise comparisons.

Results

Full results from the Kaplan-Meier and Cox proportional hazard model analyses along with pair-wise comparisons from the Kaplan-Meier analyses are presented in

the Appendix along with the raw data. The mean survival time (MST) of 50% of the population in hours from the Kaplan-Meier analyses and the hazard ratio (HR) from the Cox proportional hazard model analyses are summarized in Tables 1 - 4. MST (50%) in the control insects (water only spray) varied between 84 and 147 hours (3.5 – 6 days) with the adults and 139 to 164 hours (6 – 7 days) with the nymphs. This suggests that within the insect batches tested adults were on average less long-lived than nymphs. Also, when considering topical application, MST for Pyrethrum 5EC varied between 1 and 18 hours for adults and 1 and 116 hours for nymphs. This suggests that nymphs are also more difficult to kill than adults. Both observations would also indicate that there is considerable variability between batches in terms of both general health and ability to withstand insecticide application. In comparison the surface residue application gave MSTs of 14 – 99 hours (adults) and 16 – 86 hours (nymphs) indicating that surface residues are generally less effective than direct contact.

From the results it can be seen that Pyrethrum 5EC is the most effective treatment (lowest MST and highest HR) and Spruzit was the only other treatment which offered any consistent levels of control (MST for topical application 35 – 75 adults and 21 – 103 nymphs). The other four test substances offered small and inconsistent levels of control. In comparison with the control insects after topical application AHDB9967 significantly increased mortality in 1 adult batch and 1 nymph batch, AHDB9735 significantly increased mortality in 1 adult batch and 1 nymph batch, AHDB9971 significantly increased mortality in 2 adult batches and 1 nymph batch and AHDB9736 significantly increased mortality in 1 adult batch and no nymph batches.

Table 1. Adult *M. pygmaeus* with topical application of sprays. The mean survival time (MST) of 50% of the population in hours from Kaplan-Meier analyses and the hazard ratio (HR) from Cox proportional hazard model analyses. MST values followed by “a” are not significantly different from the untreated control and those followed by “b” are not significantly different from the positive control (Pyrethrum 5EC). HR values followed by “c” are statistically significant (p<0.05).

Treatment	Batch 1				Batch 3				Batch 4				Batch 5				Batch 6			
	MST		HR		MST		HR		MST		HR		MST		HR		MST		HR	
Control	107	a			123	a			84	a			143	a			102	a		
Pyrethrum 5EC	1	b	9.37	c	18	b	7.49	c	1	b	10.34	c	4	b	12.4	c	14	b	6.01	c
Spruzit	35		2.98	c	55		3.97	c	62	a	1.08		75		2.05	c	52		2.23	c
AHDB9967	62		1.91	c	112	a	1.45		69	a	1.07		113	a	1.4		77	a	1.43	
AHDB9735	55		2.09	c	111	a	1.06		70	a	1.25		126	a	1.45		112	a	0.91	
AHDB9971	65		2.03	c	104		2.24		84	a	0.95		126	a	1.35		108	a	1.1	
AHDB9736	47		2.37	c	99	a	1.88		92	a	0.86		140	a	0.86		88	a	1.45	

Table 2. Adult *M. pygmaeus* with surface residue application of sprays. The mean survival time (MST) of the population in hours from Kaplan-Meier analyses and the hazard ratio (HR) from Cox proportional hazard model analyses. MST values followed by “a” are not significantly different from the untreated control and those followed by “b” are not significantly different from the positive control (Pyrethrum 5EC). HR values followed by “c” are statistically significant (p<0.05).

Treatment	Batch 2				Batch 3				Batch 4				Batch 5			
	MST		HR		MST		HR		MST		HR		MST		HR	
Control	141	a			126	a			87	a			147	a		
Pyrethrum 5EC	20	b	5.69	c	99	b	2.16	c	52	b	1.74	c	14	b	6.44	c
Spruzit	38	b	3.33	c	123	a	1.12		79	a	1.12		39		3.53	c
AHDB9967	85		1.71		104	b	1.87		69	b	1.28		97	a	1.5	
AHDB9735	54		2.89	c	132	ab	1.3		79	a	1.12		108	a	1.39	
AHDB9971	128	a	0.83		120	a	0.98		83	a	0.97		116	a	1.1	
AHDB9736	78		1.93	c	131	a	0.97		87	a	0.84		112	a	1.31	

Table 3. Nymph *M. pygmaeus* with topical application of sprays. The mean survival time (MST) of the population in hours from Kaplan-Meier analyses and the hazard ratio (HR) from Cox proportional hazard model analyses. MST values followed by “a” are not significantly different from the untreated control and those followed by “b” are not significantly different from the positive control (Pyrethrum 5EC). HR values followed by “c” are statistically significant (p<0.05).

Treatment	Batch 7				Batch 8				Batch 9				Batch 10				Batch 11			
	MST		HR		MST		HR		MST		HR		MST		HR		MST		HR	
Control	139	a			147	a			147	a			164	a			153	a		
Pyrethrum 5EC	116	b	4.26	c	49	b	5.28	c	29	b	10.86	c	44	b	13.11	c	1	b	40.01	c
Spruzit	98	b	3.92	c	103	a	2.22		51	b	7.75	c	62	b	11.87	c	21		19.87	c
AHDB9967	122	ab	2.14		143	a	0.91		150	a	0.97		153	a	2.08		121		4.16	c
AHDB9735	126	a	2.11		150	a	1.09		157	a	1.13		134		3.41		157	a	1.18	
AHDB9971	131	a	1.38		153	a	1.18		146	a	0.99		162	a	2.02		127		3.49	c
AHDB9736	132	a	1.03		164	a	0.71		151	a	1.16		128	a	2.74		129	a	2.31	

Table 4. Nymph *M. pygmaeus* with surface residue application of sprays. The mean survival time (MST) of the population in hours from Kaplan-Meier analyses and the hazard ratio (HR) from Cox proportional hazard model analyses. MST values followed by “a” are not significantly different from the untreated control and those followed by “b” are not significantly different from the positive control (Pyrethrum 5EC). HR values followed by “c” are statistically significant (p<0.05).

Treatment	Batch 7				Batch 8				Batch 9				Batch 10				Batch 11			
	MST		HR		MST		HR		MST		HR		MST		HR		MST		HR	
Control	144	a			161	a			158	a			152	a			160	a		
Pyrethrum 5EC	68	b	33.9	c	74	b	9.41	c	16	b	15.92	c	86	b	5.36	c	53	b	18.09	c
Spruzit	93		14.89	c	40	b	14.82	c	18	b	15.93	c	117	a	2.32		115		4.18	c
AHDB9967	112		13.03	c	117		4.13	c	120	a	2.65		139	a	1.54		148		3.45	c
AHDB9735	136		5.2		135		3.96	c	156	a	1		162	a	0.81		162		4.88	c
AHDB9971	121		5.74		78	b	8.21	c	137	a	0.2		162	a	1.21		162		3.66	c
AHDB9736	138	a	3.09		113		4.81	c	134	a	2.74		153	a	0.86		155		4.31	c

Discussion

As observed in the results section there was considerable variability between insect batches both in terms of general health and susceptibility to insecticides. However, it is clear that the standard Pyrethrum 5EC treatment was the most effective and the only other treatment which gave similar levels of control was Spruzit which contains the same active ingredients (pyrethrins). The total dose of pyrethrins was greater in the Spruzit treatment than in the Pyrethrum 5EC treatment (55.1 vs 32.5 g/ha) so the greater control achieved with Pyrethrum 5EC compared with Spruzit might be explained by the presence of the synergist piperonyl butoxide (25% w/v) in Pyrethrum 5EC. As might have been expected, surface residues caused less mortality than direct contact, but more surprising was that nymphs were more resistant to chemical sprays than adults.

The other four products tested offered small levels of control in some insect batches but in other batches they had little or no effect.

All treatments mixed and sprayed well.

A further aim of the study was to determine whether there was anything that might be evaluated further for control of *Nesidiocoris tenuis* on tomato. It is likely that products that are effective against *M. pygmaeus* would also be effective against *N. tenuis*. Thus, it is reasonable to assume that only Pyrethrum 5EC and Spruzit would have activity against *N. tenuis*. There is no opportunity to pursue this further with AHDB funding.

Conclusions

- Pyrethrum 5EC was the most effective product tested
- Spruzit was the only other product to offer reasonable levels of control
- Differences between Pyrethrum 5EC and Spruzit may be due to piperonyl butoxide (synergist) in Pyrethrum 5EC formulation
- There is considerable variation between *M. pygmaeus* batches in terms of health and ability to withstand chemical application.
- *M. pygmaeus* nymphs are more resistant to chemical application than adults.

Acknowledgements

We would like to thank the AHDB for funding and supporting this project and for the financial and in-kind contributions from the crop protection manufactures and distributors involved with the SCEPTREplus programme as listed below: Agrii, Alpha Biocontrol Ltd, Andermatt, Arysta Lifescience, BASF, Bayer, Belchim, Bionema Limited, Certis Europe, Corteva, Eden Research, Fargro Limited, FMC, Gowan, Interfarm, Lallemand Plant Care, Novozymes, Oro Agri, Russell IPM, Sumitomo Chemicals, Syngenta and UPL.

Appendix

a. Raw data from assessments

Individual	Topical application			Adult batch 1	Surface residue
	Hour	Event	Rep	Treatment	
1	168	1	1	1	
2	168	1	1	1	
3	168	1	1	1	
4	168	1	1	1	
5	1	1	1	1	
1	168	1	2	1	
2	72	1	2	1	
3	72	1	2	1	
4	72	1	2	1	
5	24	1	2	1	
1	168	1	3	1	
2	168	1	3	1	
3	72	1	3	1	
4	72	1	3	1	
5	24	1	3	1	
1	168	1	4	1	
2	168	1	4	1	
3	168	1	4	1	
4	168	1	4	1	
5	72	1	4	1	
1	72	1	5	1	
2	72	1	5	1	
3	72	1	5	1	
4	72	1	5	1	
5	72	1	5	1	
1	1	1	1	2	
2	1	1	1	2	
3	1	1	1	2	
4	1	1	1	2	
5	1	1	1	2	
1	1	1	2	2	
2	1	1	2	2	
3	1	1	2	2	
4	1	1	2	2	
5	1	1	2	2	
1	1	1	3	2	
2	1	1	3	2	
3	1	1	3	2	
4	1	1	3	2	
5	1	1	3	2	
1	1	1	4	2	
2	1	1	4	2	
3	1	1	4	2	
4	1	1	4	2	
5	1	1	4	2	

1	1	1	5	2
2	1	1	5	2
3	1	1	5	2
4	1	1	5	2
5	1	1	5	2
1	168	1	1	3
2	72	1	1	3
3	1	1	1	3
4	1	1	1	3
5	1	1	1	3
1	72	1	2	3
2	72	1	2	3
3	72	1	2	3
4	1	1	2	3
5	1	1	2	3
1	72	1	3	3
2	72	1	3	3
3	24	1	3	3
4	24	1	3	3
5	1	1	3	3
1	24	1	4	3
2	1	1	4	3
3	1	1	4	3
4	1	1	4	3
5	1	1	4	3
1	72	1	5	3
2	72	1	5	3
3	24	1	5	3
4	24	1	5	3
5	1	1	5	3
1	72	1	1	4
2	72	1	1	4
3	72	1	1	4
4	72	1	1	4
5	72	1	1	4
1	72	1	2	4
2	72	1	2	4
3	72	1	2	4
4	72	1	2	4
5	1	1	2	4
1	72	1	3	4
2	72	1	3	4
3	72	1	3	4
4	72	1	3	4
5	72	1	3	4
1	72	1	4	4
2	72	1	4	4
3	72	1	4	4
4	72	1	4	4
5	24	1	4	4
1	72	1	5	4
2	72	1	5	4
3	72	1	5	4
4	24	1	5	4

5	1	1	5	4
1	72	1	1	5
2	72	1	1	5
3	72	1	1	5
4	72	1	1	5
5	1	1	1	5
1	72	1	2	5
2	72	1	2	5
3	72	1	2	5
4	1	1	2	5
5	1	1	2	5
1	72	1	3	5
2	72	1	3	5
3	72	1	3	5
4	1	1	3	5
5	1	1	3	5
1	72	1	4	5
2	72	1	4	5
3	72	1	4	5
4	72	1	4	5
5	72	1	4	5
1	72	1	5	5
2	72	1	5	5
3	72	1	5	5
4	72	1	5	5
5	1	1	5	5
1	72	1	1	6
2	72	1	1	6
3	72	1	1	6
4	72	1	1	6
5	1	1	1	6
1	72	1	2	6
2	72	1	2	6
3	72	1	2	6
4	72	1	2	6
5	1	1	2	6
1	144	1	3	6
2	72	1	3	6
3	72	1	3	6
4	72	1	3	6
5	72	1	3	6
1	144	1	4	6
2	144	1	4	6
3	72	1	4	6
4	24	1	4	6
5	1	1	4	6
1	144	1	5	6
2	72	1	5	6
3	24	1	5	6
4	1	1	5	6
5	1	1	5	6
1	72	1	1	7
2	72	1	1	7
3	72	1	1	7

4	72	1	1	7
5	72	1	1	7
1	72	1	2	7
2	72	1	2	7
3	1	1	2	7
4	1	1	2	7
5	1	1	2	7
1	72	1	3	7
2	72	1	3	7
3	72	1	3	7
4	24	1	3	7
5	1	1	3	7
1	72	1	4	7
2	72	1	4	7
3	72	1	4	7
4	1	1	4	7
5	1	1	4	7
1	72	1	5	7
2	72	1	5	7
3	72	1	5	7
4	1	1	5	7
5	1	1	5	7

Adult batch 2

Topical application

Surface residue

Individual	Hour	Event	Rep	Treatment
1	144	1	1	1
2	144	1	1	1
3	144	1	1	1
4	144	1	1	1
5	144	1	1	1
1	144	1	2	1
2	144	1	2	1
3	144	1	2	1
4	144	1	2	1
5	144	1	2	1
1	144	1	3	1
2	144	1	3	1
3	144	1	3	1
4	144	1	3	1
5	144	1	3	1
1	144	0	4	1
2	144	1	4	1
3	144	1	4	1
4	144	1	4	1
5	72	1	4	1
1	144	1	5	1
2	144	1	5	1
3	144	1	5	1
4	144	1	5	1
5	144	1	5	1
1	144	1	1	2
2	24	1	1	2
3	1	1	1	2

4	1	1	1	2
5	1	1	1	2
1	24	1	2	2
2	24	1	2	2
3	24	1	2	2
4	24	1	2	2
5	1	1	2	2
1	24	1	3	2
2	24	1	3	2
3	24	1	3	2
4	1	1	3	2
5	1	1	3	2
1	24	1	4	2
2	24	1	4	2
3	1	1	4	2
4	1	1	4	2
5	1	1	4	2
1	24	1	5	2
2	24	1	5	2
3	24	1	5	2
4	24	1	5	2
5	1	1	5	2
1	144	1	1	3
2	72	1	1	3
3	24	1	1	3
4	24	1	1	3
5	24	1	1	3
1	24	1	2	3
2	24	1	2	3
3	1	1	2	3
4	1	1	2	3
5	1	1	2	3
1	144	1	3	3
2	24	1	3	3
3	24	1	3	3
4	1	1	3	3
5	1	1	3	3
1	144	1	4	3
2	24	1	4	3
3	24	1	4	3
4	24	1	4	3
5	1	1	4	3
1	144	0	5	3
2	24	1	5	3
3	24	1	5	3
4	1	1	5	3
5	1	1	5	3
1	72	1	1	4
2	72	1	1	4
3	72	1	1	4
4	24	1	1	4
5	24	1	1	4
1	144	1	2	4
2	72	1	2	4

3	72	1	2	4
4	72	1	2	4
5	72	1	2	4
1	144	1	3	4
2	144	1	3	4
3	144	1	3	4
4	72	1	3	4
5	72	1	3	4
1	144	1	4	4
2	72	1	4	4
3	72	1	4	4
4	24	1	4	4
5	24	1	4	4
1	144	0	5	4
2	144	0	5	4
3	144	1	5	4
4	72	1	5	4
5	1	1	5	4
1	72	1	1	5
2	72	1	1	5
3	72	1	1	5
4	24	1	1	5
5	1	1	1	5
1	72	1	2	5
2	72	1	2	5
3	72	1	2	5
4	24	1	2	5
5	1	1	2	5
1	72	1	3	5
2	72	1	3	5
3	72	1	3	5
4	72	1	3	5
5	1	1	3	5
1	144	1	4	5
2	144	1	4	5
3	24	1	4	5
4	24	1	4	5
5	1	1	4	5
1	144	1	5	5
2	72	1	5	5
3	24	1	5	5
4	1	1	5	5
5	1	1	5	5
1	144	0	1	6
2	144	0	1	6
3	144	1	1	6
4	144	1	1	6
5	72	1	1	6
1	144	1	2	6
2	144	1	2	6
3	144	1	2	6
4	144	1	2	6
5	72	1	2	6
1	144	0	3	6

2	144	0	3	6
3	144	1	3	6
4	144	1	3	6
5	1	1	3	6
1	144	1	4	6
2	144	1	4	6
3	144	1	4	6
4	144	1	4	6
5	24	1	4	6
1	144	0	5	6
2	144	0	5	6
3	144	0	5	6
4	144	1	5	6
5	144	1	5	6
1	144	1	1	7
2	144	1	1	7
3	144	1	1	7
4	72	1	1	7
5	24	1	1	7
1	144	1	2	7
2	24	1	2	7
3	24	1	2	7
4	1	1	2	7
5	1	1	2	7
1	144	1	3	7
2	72	1	3	7
3	24	1	3	7
4	24	1	3	7
5	24	1	3	7
1	144	1	4	7
2	144	1	4	7
3	144	1	4	7
4	144	1	4	7
5	1	1	4	7
1	72	1	5	7
2	72	1	5	7
3	72	1	5	7
4	72	1	5	7
5	72	1	5	7

Adult batch 3

Individual	Topical application				Individual	Surface residue			
	Hour	Event	Rep	Treatment		Hour	Event	Rep	Treatment
1	144	0	1	1	1	144	0	1	1
2	144	0	1	1	2	144	0	1	1
3	144	0	1	1	3	144	0	1	1
4	96	1	1	1	4	144	0	1	1
5	24	1	1	1	5	48	1	1	1
1	144	0	2	1	1	144	0	2	1
2	144	0	2	1	2	144	0	2	1
3	144	0	2	1	3	144	1	2	1
4	96	1	2	1	4	144	1	2	1
5	1	1	2	1	5	48	1	2	1
1	144	0	3	1	1	144	0	3	1

2	144	0	3	1	2	144	0	3	1
3	144	0	3	1	3	144	1	3	1
4	144	0	3	1	4	144	1	3	1
5	96	0	3	1	5	24	1	3	1
1	144	0	4	1	1	144	0	4	1
2	144	0	4	1	2	144	0	4	1
3	144	0	4	1	3	144	0	4	1
4	144	1	4	1	4	144	0	4	1
5	96	1	4	1	5	144	1	4	1
1	144	0	5	1	1	144	0	5	1
2	144	0	5	1	2	144	0	5	1
3	144	0	5	1	3	144	1	5	1
4	144	1	5	1	4	144	1	5	1
5	24	1	5	1	5	1	1	5	1
1	1	1	1	2	1	144	1	1	2
2	1	1	1	2	2	144	1	1	2
3	1	1	1	2	3	144	1	1	2
4	1	1	1	2	4	144	1	1	2
5	1	1	1	2	5	144	1	1	2
1	1	1	2	2	1	144	0	2	2
2	1	1	2	2	2	144	0	2	2
3	1	1	2	2	3	144	1	2	2
4	1	1	2	2	4	144	1	2	2
5	1	1	2	2	5	48	1	2	2
1	144	0	3	2	1	144	1	3	2
2	144	0	3	2	2	144	1	3	2
3	144	1	3	2	3	48	1	3	2
4	1	1	3	2	4	48	1	3	2
5	1	1	3	2	5	24	1	3	2
1	1	1	4	2	1	1	1	4	2
2	1	1	4	2	2	1	1	4	2
3	1	1	4	2	3	1	1	4	2
4	1	1	4	2	4	1	1	4	2
5	1	1	4	2	5	1	1	4	2
1	1	1	5	2	1	144	0	5	2
2	1	1	5	2	2	144	0	5	2
3	1	1	5	2	3	144	0	5	2
4	1	1	5	2	4	144	0	5	2
5	1	1	5	2	5	144	1	5	2
1	96	1	1	3	1	144	0	1	3
2	24	1	1	3	2	144	0	1	3
3	24	1	1	3	3	144	0	1	3
4	24	1	1	3	4	144	0	1	3
5	1	1	1	3	5	24	1	1	3
1	144	0	2	3	1	144	0	2	3
2	144	1	2	3	2	144	1	2	3
3	96	1	2	3	3	144	1	2	3
4	24	1	2	3	4	1	1	2	3
5	24	1	2	3	5	1	1	2	3
1	144	0	3	3	1	144	0	3	3
2	144	1	3	3	2	144	0	3	3
3	1	1	3	3	3	144	0	3	3
4	1	1	3	3	4	144	0	3	3
5	1	1	3	3	5	144	1	3	3

1	144	0	4	3	1	144	0	4	3
2	24	1	4	3	2	144	0	4	3
3	24	1	4	3	3	144	0	4	3
4	24	1	4	3	4	144	1	4	3
5	24	1	4	3	5	24	1	4	3
1	144	0	5	3	1	144	0	5	3
2	24	1	5	3	2	144	1	5	3
3	24	1	5	3	3	144	1	5	3
4	24	1	5	3	4	144	1	5	3
5	24	1	5	3	5	144	1	5	3
1	144	0	1	4	1	144	0	1	4
2	144	0	1	4	2	144	1	1	4
3	144	0	1	4	3	144	1	1	4
4	144	1	1	4	4	144	1	1	4
5	24	1	1	4	5	48	1	1	4
1	144	0	2	4	1	144	0	2	4
2	144	0	2	4	2	144	0	2	4
3	144	0	2	4	3	144	0	2	4
4	96	1	2	4	4	48	1	2	4
5	1	1	2	4	5	48	1	2	4
1	144	0	3	4	1	144	1	3	4
2	144	0	3	4	2	144	1	3	4
3	144	1	3	4	3	48	1	3	4
4	96	1	3	4	4	24	1	3	4
5	1	1	3	4	5	24	1	3	4
1	144	0	4	4	1	144	1	4	4
2	144	0	4	4	2	48	1	4	4
3	144	1	4	4	3	48	1	4	4
4	144	1	4	4	4	48	1	4	4
5	1	1	4	4	5	48	1	4	4
1	144	0	5	4	1	144	0	5	4
2	144	0	5	4	2	144	0	5	4
3	144	0	5	4	3	144	0	5	4
4	144	0	5	4	4	144	0	5	4
5	1	1	5	4	5	144	1	5	4
1	144	0	1	5	1	144	0	1	5
2	144	0	1	5	2	144	1	1	5
3	144	0	1	5	3	144	1	1	5
4	24	1	1	5	4	144	1	1	5
5	24	1	1	5	5	48	1	1	5
1	144	0	2	5	1	144	0	2	5
2	144	0	2	5	2	144	0	2	5
3	144	0	2	5	3	144	0	2	5
4	144	0	2	5	4	144	1	2	5
5	1	1	2	5	5	144	1	2	5
1	144	0	3	5	1	144	0	3	5
2	144	0	3	5	2	144	0	3	5
3	144	0	3	5	3	144	0	3	5
4	144	0	3	5	4	48	1	3	5
5	1	1	3	5	5	48	1	3	5
1	144	0	4	5	1	144	0	4	5
2	144	0	4	5	2	144	0	4	5
3	144	0	4	5	3	144	1	4	5
4	24	1	4	5	4	144	1	4	5

5	1	1	4	5	5	144	1	4	5
1	144	0	5	5	1	144	0	5	5
2	144	0	5	5	2	144	1	5	5
3	144	0	5	5	3	144	1	5	5
4	144	1	5	5	4	144	1	5	5
5	96	1	5	5	5	144	1	5	5
1	144	0	1	6	1	144	0	1	6
2	144	1	1	6	2	144	0	1	6
3	96	1	1	6	3	144	0	1	6
4	24	1	1	6	4	144	0	1	6
5	1	1	1	6	5	144	1	1	6
1	144	0	2	6	1	144	0	2	6
2	144	0	2	6	2	144	1	2	6
3	144	0	2	6	3	48	1	2	6
4	96	1	2	6	4	48	1	2	6
5	1	1	2	6	5	48	1	2	6
1	144	0	3	6	1	144	0	3	6
2	144	0	3	6	2	144	0	3	6
3	144	1	3	6	3	144	0	3	6
4	96	1	3	6	4	144	1	3	6
5	1	1	3	6	5	24	1	3	6
1	144	0	4	6	1	144	0	4	6
2	144	1	4	6	2	144	0	4	6
3	96	1	4	6	3	144	0	4	6
4	96	1	4	6	4	144	0	4	6
5	96	1	4	6	5	144	0	4	6
1	144	0	5	6	1	144	0	5	6
2	144	0	5	6	2	144	1	5	6
3	144	1	5	6	3	48	0	5	6
4	96	1	5	6	4	48	1	5	6
5	24	1	5	6	5	48	1	5	6
1	144	0	1	7	1	144	0	1	7
2	144	0	1	7	2	144	0	1	7
3	144	0	1	7	3	144	1	1	7
4	144	1	1	7	4	144	1	1	7
5	144	1	1	7	5	144	1	1	7
1	144	0	2	7	1	144	0	2	7
2	144	0	2	7	2	144	0	2	7
3	96	1	2	7	3	144	0	2	7
4	96	1	2	7	4	144	0	2	7
5	24	1	2	7	5	144	0	2	7
1	144	0	3	7	1	144	0	3	7
2	1	1	3	7	2	144	0	3	7
3	1	1	3	7	3	144	1	3	7
4	1	1	3	7	4	144	1	3	7
5	1	1	3	7	5	24	1	3	7
1	144	0	4	7	1	144	0	4	7
2	144	0	4	7	2	144	1	4	7
3	144	0	4	7	3	144	1	4	7
4	96	1	4	7	4	48	1	4	7
5	1	1	4	7	5	24	1	4	7
1	144	0	5	7	1	144	0	5	7
2	144	0	5	7	2	144	0	5	7
3	144	0	5	7	3	144	0	5	7

4	144	1	5	7	4	144	0	5	7
5	1	1	5	7	5	144	1	5	7

Adult batch 4

Topical application					Surface residue				
Individual	Hour	Event	Rep	Treatment	Individual	Hour	Event	Rep	Treatment
1	96	1	1	1	1	96	1	1	1
2	96	1	1	1	2	96	1	1	1
3	96	1	1	1	3	96	1	1	1
4	96	1	1	1	4	96	1	1	1
5	24	1	1	1	5	24	1	1	1
1	96	1	2	1	1	96	1	2	1
2	96	1	2	1	2	96	1	2	1
3	96	1	2	1	3	96	1	2	1
4	96	1	2	1	4	96	1	2	1
5	96	1	2	1	5	96	1	2	1
1	96	1	3	1	1	96	1	3	1
2	96	1	3	1	2	96	1	3	1
3	96	1	3	1	3	96	1	3	1
4	96	1	3	1	4	24	1	3	1
5	1	1	3	1	5	24	1	3	1
1	96	0	4	1	1	96	1	4	1
2	96	1	4	1	2	96	1	4	1
3	96	1	4	1	3	96	1	4	1
4	96	1	4	1	4	96	1	4	1
5	24	1	4	1	5	96	1	4	1
1	1	1	1	2	1	96	1	5	1
2	1	1	1	2	2	96	1	5	1
3	1	1	1	2	3	96	1	5	1
4	1	1	1	2	4	96	1	5	1
5	1	1	1	2	5	96	1	5	1
1	1	1	2	2	1	96	1	1	2
2	1	1	2	2	2	24	1	1	2
3	1	1	2	2	3	24	1	1	2
4	1	1	2	2	4	24	1	1	2
5	1	1	2	2	5	24	1	1	2
1	1	1	3	2	1	96	1	2	2
2	1	1	3	2	2	96	1	2	2
3	1	1	3	2	3	24	1	2	2
4	1	1	3	2	4	24	1	2	2
5	1	1	3	2	5	1	1	2	2
1	1	1	4	2	1	96	1	3	2
2	1	1	4	2	2	96	1	3	2
3	1	1	4	2	3	96	1	3	2
4	1	1	4	2	4	24	1	3	2
5	1	1	4	2	5	24	1	3	2
1	24	1	1	3	1	96	1	4	2
2	24	1	1	3	2	96	1	4	2
3	24	1	1	3	3	24	1	4	2
4	24	1	1	3	4	24	1	4	2
5	24	1	1	3	5	24	1	4	2
1	96	0	2	3	1	96	1	5	2
2	96	0	2	3	2	96	1	5	2
3	96	1	2	3	3	24	1	5	2

4	96	1	2	3	4	24	1	5	2
5	1	1	2	3	5	24	1	5	2
1	96	0	3	3	1	96	1	1	3
2	96	1	3	3	2	96	1	1	3
3	96	1	3	3	3	96	1	1	3
4	96	1	3	3	4	96	1	1	3
5	24	1	3	3	5	24	1	1	3
1	96	0	4	3	1	96	1	2	3
2	96	0	4	3	2	96	1	2	3
3	96	1	4	3	3	96	1	2	3
4	24	1	4	3	4	24	1	2	3
5	24	1	4	3	5	24	1	2	3
1	96	0	1	4	1	96	1	3	3
2	96	1	1	4	2	96	1	3	3
3	96	1	1	4	3	96	1	3	3
4	24	1	1	4	4	96	1	3	3
5	1	1	1	4	5	24	1	3	3
1	96	1	2	4	1	96	1	4	3
2	96	1	2	4	2	96	1	4	3
3	96	1	2	4	3	96	1	4	3
4	96	1	2	4	4	96	1	4	3
5	1	1	2	4	5	24	1	4	3
1	96	0	3	4	1	96	1	5	3
2	96	0	3	4	2	96	1	5	3
3	96	1	3	4	3	96	1	5	3
4	96	1	3	4	4	96	1	5	3
5	1	1	3	4	5	24	1	5	3
1	96	1	4	4	1	96	1	1	4
2	96	1	4	4	2	96	1	1	4
3	96	1	4	4	3	96	1	1	4
4	1	1	4	4	4	24	1	1	4
5	1	1	4	4	5	24	1	1	4
1	96	1	1	5	1	96	1	2	4
2	96	1	1	5	2	96	1	2	4
3	96	1	1	5	3	96	1	2	4
4	24	1	1	5	4	96	1	2	4
5	24	1	1	5	5	24	1	2	4
1	96	1	2	5	1	96	1	3	4
2	96	1	2	5	2	96	1	3	4
3	96	1	2	5	3	96	1	3	4
4	1	1	2	5	4	24	1	3	4
5	1	1	2	5	5	24	1	3	4
1	96	1	3	5	1	96	1	4	4
2	96	1	3	5	2	96	1	4	4
3	96	1	3	5	3	24	1	4	4
4	96	1	3	5	4	24	1	4	4
5	96	1	3	5	5	1	1	4	4
1	96	1	4	5	1	96	1	5	4
2	96	1	4	5	2	96	1	5	4
3	96	1	4	5	3	96	1	5	4
4	1	1	4	5	4	96	1	5	4
5	1	1	4	5	5	24	1	5	4
1	96	1	1	6	1	96	1	1	5
2	96	1	1	6	2	96	1	1	5

3	96	1	1	6	3	96	1	1	5
4	96	1	1	6	4	96	1	1	5
5	24	1	1	6	5	24	1	1	5
1	96	1	2	6	1	96	1	2	5
2	96	1	2	6	2	96	1	2	5
3	96	1	2	6	3	96	1	2	5
4	96	1	2	6	4	96	1	2	5
5	1	1	2	6	5	24	1	2	5
1	96	0	3	6	1	96	1	3	5
2	96	0	3	6	2	96	1	3	5
3	96	1	3	6	3	96	1	3	5
4	96	1	3	6	4	24	1	3	5
5	96	1	3	6	5	24	1	3	5
1	96	1	4	6	1	96	1	4	5
2	96	1	4	6	2	96	1	4	5
3	96	1	4	6	3	96	1	4	5
4	96	1	4	6	4	96	1	4	5
5	24	1	4	6	5	24	1	4	5
1	96	1	1	7	1	96	1	5	5
2	96	1	1	7	2	96	1	5	5
3	96	1	1	7	3	96	1	5	5
4	96	1	1	7	4	96	1	5	5
5	96	1	1	7	5	24	1	5	5
1	96	1	2	7	1	96	1	1	6
2	96	1	2	7	2	96	1	1	6
3	96	1	2	7	3	96	1	1	6
4	96	1	2	7	4	24	1	1	6
5	96	1	2	7	5	1	1	1	6
1	96	0	3	7	1	96	1	2	6
2	96	0	3	7	2	96	1	2	6
3	96	1	3	7	3	96	1	2	6
4	96	1	3	7	4	96	1	2	6
5	96	1	3	7	5	24	1	2	6
1	96	1	4	7	1	96	0	3	6
2	96	1	4	7	2	96	0	3	6
3	96	1	4	7	3	96	1	3	6
4	96	1	4	7	4	96	1	3	6
5	24	1	4	7	5	1	1	3	6
					1	96	1	4	6
					2	96	1	4	6
					3	96	1	4	6
					4	96	1	4	6
					5	96	1	4	6
					1	96	1	5	6
					2	96	1	5	6
					3	96	1	5	6
					4	96	1	5	6
					5	96	1	5	6
					1	96	1	1	7
					2	96	1	1	7
					3	96	1	1	7
					4	96	1	1	7
					5	24	1	1	7
					1	96	0	2	7

2	96	0	2	7
3	96	1	2	7
4	96	1	2	7
5	96	1	2	7
1	96	0	3	7
2	96	0	3	7
3	96	1	3	7
4	96	1	3	7
5	96	1	3	7
1	96	1	4	7
2	96	1	4	7
3	96	1	4	7
4	96	1	4	7
5	24	1	4	7
1	96	1	5	7
2	96	1	5	7
3	96	1	5	7
4	96	1	5	7
5	24	1	5	7

Adult batch 5

Topical application

Surface residue

Individual	Hour	Event	Rep	Treatment	Individual	Hour	Event	Rep	Treatment
1	168	0	1	1	1	168	0	1	1
2	168	1	1	1	2	168	1	1	1
3	168	1	1	1	3	168	1	1	1
4	168	1	1	1	4	72	1	1	1
5	48	1	1	1	5	24	1	1	1
1	168	0	2	1	1	168	1	2	1
2	168	0	2	1	2	168	1	2	1
3	168	1	2	1	3	168	1	2	1
4	168	1	2	1	4	168	1	2	1
5	24	1	2	1	5	72	1	2	1
1	168	0	3	1	1	168	0	3	1
2	168	1	3	1	2	168	0	3	1
3	168	1	3	1	3	168	1	3	1
4	168	1	3	1	4	168	1	3	1
5	168	1	3	1	5	168	1	3	1
1	168	0	4	1	1	168	0	4	1
2	168	0	4	1	2	168	1	4	1
3	168	1	4	1	3	168	1	4	1
4	168	1	4	1	4	168	1	4	1
5	24	1	4	1	5	72	1	4	1
1	168	0	5	1	1	168	0	5	1
2	168	0	5	1	2	168	1	5	1
3	168	1	5	1	3	168	1	5	1
4	96	1	5	1	4	168	1	5	1
5	24	1	5	1	5	72	1	5	1
1	1	1	1	2	1	24	1	1	2
2	1	1	1	2	2	24	1	1	2
3	1	1	1	2	3	1	1	1	2
4	1	1	1	2	4	1	1	1	2
5	1	1	1	2	5	1	1	1	2
1	1	0	2	2	1	24	1	2	2

2	1	1	2	2	2	1	1	2	2
3	1	1	2	2	3	1	1	2	2
4	1	1	2	2	4	1	1	2	2
5	1	1	2	2	5	1	1	2	2
1	24	1	3	2	1	24	1	3	2
2	1	1	3	2	2	1	1	3	2
3	1	1	3	2	3	1	1	3	2
4	1	1	3	2	4	1	1	3	2
5	1	1	3	2	5	1	1	3	2
1	1	0	4	2	1	72	0	4	2
2	1	1	4	2	2	72	1	4	2
3	1	1	4	2	3	24	1	4	2
4	1	1	4	2	4	1	1	4	2
5	1	1	4	2	5	1	1	4	2
1	1	1	5	2	1	72	1	5	2
2	1	1	5	2	2	1	1	5	2
3	1	1	5	2	3	1	1	5	2
4	1	1	5	2	4	1	1	5	2
5	1	1	5	2	5	1	1	5	2
1	168	0	1	3	1	168	1	1	3
2	168	0	1	3	2	24	1	1	3
3	168	0	1	3	3	24	1	1	3
4	168	1	1	3	4	24	1	1	3
5	96	1	1	3	5	24	1	1	3
1	168	0	2	3	1	24	1	2	3
2	48	1	2	3	2	1	1	2	3
3	24	1	2	3	3	1	1	2	3
4	24	1	2	3	4	1	1	2	3
5	1	1	2	3	5	1	1	2	3
1	168	0	3	3	1	168	1	3	3
2	168	1	3	3	2	72	1	3	3
3	24	1	3	3	3	24	1	3	3
4	1	1	3	3	4	24	1	3	3
5	1	1	3	3	5	24	1	3	3
1	96	1	4	3	1	168	1	4	3
2	24	1	4	3	2	24	1	4	3
3	24	1	4	3	3	24	1	4	3
4	24	1	4	3	4	24	1	4	3
5	1	1	4	3	5	1	1	4	3
1	168	0	5	3	1	72	1	5	3
2	96	1	5	3	2	24	1	5	3
3	48	1	5	3	3	24	1	5	3
4	1	1	5	3	4	1	1	5	3
5	1	1	5	3	5	1	1	5	3
1	168	0	1	4	1	24	1	1	4
2	168	1	1	4	2	24	1	1	4
3	168	1	1	4	3	1	1	1	4
4	96	1	1	4	4	1	1	1	4
5	1	1	1	4	5	1	1	1	4
1	168	0	2	4	1	168	0	2	4
2	168	1	2	4	2	168	0	2	4
3	24	1	2	4	3	168	1	2	4
4	1	1	2	4	4	72	1	2	4
5	1	1	2	4	5	1	1	2	4

1	168	1	3	4	1	168	1	3	4
2	96	1	3	4	2	168	1	3	4
3	48	1	3	4	3	168	1	3	4
4	1	1	3	4	4	168	1	3	4
5	1	1	3	4	5	72	1	3	4
1	168	0	4	4	1	168	1	4	4
2	168	0	4	4	2	168	1	4	4
3	168	1	4	4	3	72	1	4	4
4	168	1	4	4	4	24	1	4	4
5	168	1	4	4	5	24	1	4	4
1	168	0	5	4	1	168	0	5	4
2	168	0	5	4	2	168	0	5	4
3	168	1	5	4	3	168	1	5	4
4	168	1	5	4	4	72	1	5	4
5	24	1	5	4	5	24	1	5	4
1	168	1	1	5	1	168	1	1	5
2	168	1	1	5	2	72	1	1	5
3	168	1	1	5	3	72	1	1	5
4	168	1	1	5	4	72	1	1	5
5	24	1	1	5	5	72	1	1	5
1	168	1	2	5	1	168	1	2	5
2	168	1	2	5	2	72	1	2	5
3	168	1	2	5	3	24	1	2	5
4	96	1	2	5	4	24	1	2	5
5	1	1	2	5	5	24	1	2	5
1	168	0	3	5	1	168	0	3	5
2	168	0	3	5	2	168	0	3	5
3	96	1	3	5	3	168	1	3	5
4	96	1	3	5	4	72	1	3	5
5	24	1	3	5	5	24	1	3	5
1	168	0	4	5	1	168	0	4	5
2	168	0	4	5	2	168	0	4	5
3	168	1	4	5	3	168	1	4	5
4	96	1	4	5	4	168	1	4	5
5	1	1	4	5	5	24	1	4	5
1	168	1	5	5	1	168	1	5	5
2	168	1	5	5	2	168	1	5	5
3	168	1	5	5	3	168	1	5	5
4	96	1	5	5	4	72	1	5	5
5	96	1	5	5	5	72	1	5	5
1	168	0	1	6	1	168	1	1	6
2	168	1	1	6	2	72	1	1	6
3	168	1	1	6	3	24	1	1	6
4	168	1	1	6	4	24	1	1	6
5	24	1	1	6	5	24	1	1	6
1	168	0	2	6	1	168	0	2	6
2	168	1	2	6	2	168	0	2	6
3	168	1	2	6	3	168	0	2	6
4	168	1	2	6	4	1	1	2	6
5	168	1	2	6	5	1	1	2	6
1	168	0	3	6	1	168	0	3	6
2	168	1	3	6	2	168	0	3	6
3	96	1	3	6	3	168	1	3	6
4	24	1	3	6	4	1	1	3	6

5	24	1	3	6	5	1	1	3	6
1	168	0	4	6	1	168	0	4	6
2	168	1	4	6	2	168	0	4	6
3	96	1	4	6	3	168	1	4	6
4	48	1	4	6	4	168	1	4	6
5	1	1	4	6	5	72	1	4	6
1	168	0	5	6	1	168	1	5	6
2	168	1	5	6	2	168	1	5	6
3	168	1	5	6	3	168	1	5	6
4	96	1	5	6	4	168	1	5	6
5	48	1	5	6	5	168	1	5	6
1	168	0	1	7	1	168	1	1	7
2	168	0	1	7	2	168	1	1	7
3	168	0	1	7	3	168	1	1	7
4	168	1	1	7	4	168	1	1	7
5	24	1	1	7	5	24	1	1	7
1	168	0	2	7	1	168	0	2	7
2	168	0	2	7	2	24	1	2	7
3	168	1	2	7	3	24	1	2	7
4	168	1	2	7	4	1	1	2	7
5	96	1	2	7	5	1	1	2	7
1	168	0	3	7	1	168	0	3	7
2	168	0	3	7	2	168	1	3	7
3	168	0	3	7	3	168	1	3	7
4	96	1	3	7	4	168	1	3	7
5	96	1	3	7	5	72	1	3	7
1	168	0	4	7	1	168	1	4	7
2	168	1	4	7	2	168	1	4	7
3	168	1	4	7	3	168	1	4	7
4	168	1	4	7	4	24	1	4	7
5	96	1	4	7	5	24	1	4	7
1	168	0	5	7	1	168	0	5	7
2	168	0	5	7	2	168	0	5	7
3	168	1	5	7	3	168	1	5	7
4	48	1	5	7	4	72	1	5	7
5	24	1	5	7	5	24	1	5	7

Adult batch 6

Individual	Topical application			Treatment	Surface residue
	Hour	Event	Rep		
1	144	0	1	1	
2	144	0	1	1	
3	144	1	1	1	
4	144	1	1	1	
5	144	1	1	1	
1	144	0	2	1	
2	144	0	2	1	
3	144	1	2	1	
4	144	1	2	1	
5	72	1	2	1	
1	144	0	3	1	
2	144	0	3	1	
3	144	1	3	1	
4	144	1	3	1	

5	72	1	3	1
1	72	1	4	1
2	72	1	4	1
3	72	1	4	1
4	24	1	4	1
5	24	1	4	1
1	144	0	5	1
2	72	1	5	1
3	24	1	5	1
4	24	1	5	1
5	1	1	5	1
1	24	1	1	2
2	1	1	1	2
3	1	1	1	2
4	1	1	1	2
5	1	1	1	2
1	72	1	2	2
2	72	1	2	2
3	1	1	2	2
4	1	1	2	2
5	1	1	2	2
1	24	1	3	2
2	1	1	3	2
3	1	1	3	2
4	1	1	3	2
5	1	1	3	2
1	72	1	4	2
2	1	1	4	2
3	1	1	4	2
4	1	1	4	2
5	1	1	4	2
1	72	1	5	2
2	1	1	5	2
3	1	1	5	2
4	1	1	5	2
5	1	1	5	2
1	144	1	1	3
2	72	1	1	3
3	24	1	1	3
4	24	1	1	3
5	1	1	1	3
1	144	0	2	3
2	144	1	2	3
3	72	1	2	3
4	24	1	2	3
5	24	1	2	3
1	144	1	3	3
2	24	1	3	3
3	24	1	3	3
4	1	1	3	3
5	1	1	3	3
1	144	0	4	3
2	72	1	4	3
3	24	1	4	3

4	24	1	4	3
5	1	1	4	3
1	72	1	5	3
2	24	1	5	3
3	24	1	5	3
4	24	1	5	3
5	24	1	5	3
1	144	0	1	4
2	144	1	1	4
3	24	1	1	4
4	1	1	1	4
5	1	1	1	4
1	144	0	2	4
2	72	1	2	4
3	72	1	2	4
4	72	1	2	4
5	72	1	2	4
1	144	0	3	4
2	144	0	3	4
3	144	1	3	4
4	72	1	3	4
5	1	1	3	4
1	144	1	4	4
2	72	1	4	4
3	24	1	4	4
4	24	1	4	4
5	1	1	4	4
1	144	0	5	4
2	144	1	5	4
3	72	1	5	4
4	24	1	5	4
5	24	1	5	4
1	144	0	1	5
2	144	0	1	5
3	144	1	1	5
4	24	1	1	5
5	1	1	1	5
1	144	0	2	5
2	144	1	2	5
3	144	1	2	5
4	144	1	2	5
5	72	1	2	5
1	144	0	3	5
2	144	0	3	5
3	144	1	3	5
4	144	1	3	5
5	24	1	3	5
1	144	0	4	5
2	144	1	4	5
3	144	1	4	5
4	72	1	4	5
5	24	1	4	5
1	144	0	5	5
2	144	1	5	5

3	144	1	5	5
4	72	1	5	5
5	72	1	5	5
1	144	0	1	6
2	144	0	1	6
3	144	1	1	6
4	144	1	1	6
5	1	1	1	6
1	144	1	2	6
2	144	1	2	6
3	72	1	2	6
4	24	1	2	6
5	24	1	2	6
1	144	1	3	6
2	144	1	3	6
3	72	1	3	6
4	72	1	3	6
5	24	1	3	6
1	144	0	4	6
2	144	0	4	6
3	144	1	4	6
4	144	1	4	6
5	24	1	4	6
1	144	1	5	6
2	144	1	5	6
3	144	1	5	6
4	144	1	5	6
5	72	1	5	6
1	144	1	1	7
2	72	1	1	7
3	24	1	1	7
4	24	1	1	7
5	1	1	1	7
1	144	0	2	7
2	144	1	2	7
3	144	1	2	7
4	144	1	2	7
5	24	1	2	7
1	144	0	3	7
2	144	1	3	7
3	144	1	3	7
4	144	1	3	7
5	72	1	3	7
1	144	1	4	7
2	144	1	4	7
3	24	1	4	7
4	24	1	4	7
5	1	1	4	7
1	72	1	5	7
2	72	1	5	7
3	72	1	5	7
4	72	1	5	7
5	72	1	5	7

Nymph batch 7

Topical application					Surface residue				
Individual	Hour	Event	Rep	Treatment	Individual	Hour	Event	Rep	Treatment
1	144	0	1	1	1	144	0	1	1
2	144	0	1	1	2	144	0	1	1
3	144	0	1	1	3	144	0	1	1
4	144	0	1	1	4	144	0	1	1
5	144	0	1	1	5	144	0	1	1
1	144	0	2	1	1	144	0	2	1
2	144	0	2	1	2	144	0	2	1
3	144	0	2	1	3	144	0	2	1
4	144	0	2	1	4	144	0	2	1
5	144	1	2	1	5	144	0	2	1
1	144	0	3	1	1	144	0	3	1
2	144	0	3	1	2	144	0	3	1
3	144	0	3	1	3	144	0	3	1
4	144	0	3	1	4	144	0	3	1
5	24	1	3	1	5	144	0	3	1
1	144	0	4	1	1	144	0	4	1
2	144	0	4	1	2	144	0	4	1
3	144	0	4	1	3	144	0	4	1
4	144	0	4	1	4	144	0	4	1
5	144	0	4	1	5	144	0	4	1
1	144	0	5	1	1	144	0	5	1
2	144	0	5	1	2	144	0	5	1
3	144	0	5	1	3	144	0	5	1
4	144	0	5	1	4	144	0	5	1
5	144	1	5	1	5	144	0	5	1
1	144	0	1	2	1	144	0	1	2
2	144	0	1	2	2	72	1	1	2
3	144	0	1	2	3	72	1	1	2
4	144	0	1	2	4	72	1	1	2
5	1	1	1	2	5	72	1	1	2
1	144	0	2	2	1	24	1	2	2
2	144	0	2	2	2	1	1	2	2
3	144	0	2	2	3	1	1	2	2
4	144	1	2	2	4	1	1	2	2
5	1	1	2	2	5	1	1	2	2
1	144	0	3	2	1	144	0	3	2
2	144	1	3	2	2	72	1	3	2
3	144	1	3	2	3	72	1	3	2
4	144	1	3	2	4	24	1	3	2
5	1	1	3	2	5	1	1	3	2
1	144	0	4	2	1	144	0	4	2
2	144	0	4	2	2	144	0	4	2
3	144	0	4	2	3	72	1	4	2
4	144	1	4	2	4	1	1	4	2
5	24	1	4	2	5	1	1	4	2
1	144	0	5	2	1	144	1	5	2
2	144	0	5	2	2	144	1	5	2
3	144	0	5	2	3	144	1	5	2
4	144	1	5	2	4	144	1	5	2
5	1	1	5	2	5	1	1	5	2
1	144	0	1	3	1	144	0	1	3

2	144	0	1	3	2	144	0	1	3
3	48	0	1	3	3	144	0	1	3
4	24	0	1	3	4	72	1	1	3
5	24	1	1	3	5	1	1	1	3
1	144	0	2	3	1	144	0	2	3
2	144	0	2	3	2	144	0	2	3
3	144	0	2	3	3	144	0	2	3
4	24	1	2	3	4	1	1	2	3
5	24	1	2	3	5	1	1	2	3
1	144	0	3	3	1	144	0	3	3
2	144	0	3	3	2	144	0	3	3
3	144	0	3	3	3	144	0	3	3
4	24	1	3	3	4	144	0	3	3
5	1	1	3	3	5	24	1	3	3
1	144	0	4	3	1	144	0	4	3
2	144	0	4	3	2	144	0	4	3
3	144	0	4	3	3	144	0	4	3
4	24	1	4	3	4	24	1	4	3
5	24	1	4	3	5	1	1	4	3
1	144	0	5	3	1	144	0	5	3
2	144	0	5	3	2	144	1	5	3
3	144	0	5	3	3	24	1	5	3
4	1	1	5	3	4	24	1	5	3
5	1	1	5	3	5	1	1	5	3
1	144	0	1	4	1	144	0	1	4
2	144	0	1	4	2	144	0	1	4
3	144	0	1	4	3	144	0	1	4
4	144	0	1	4	4	144	1	1	4
5	24	1	1	4	5	1	1	1	4
1	144	0	2	4	1	144	0	2	4
2	144	0	2	4	2	144	0	2	4
3	48	1	2	4	3	144	0	2	4
4	48	1	2	4	4	144	0	2	4
5	24	1	2	4	5	1	1	2	4
1	144	0	3	4	1	144	0	3	4
2	144	0	3	4	2	144	0	3	4
3	144	0	3	4	3	144	0	3	4
4	144	0	3	4	4	144	1	3	4
5	24	1	3	4	5	1	1	3	4
1	144	0	4	4	1	144	0	4	4
2	144	0	4	4	2	144	0	4	4
3	144	0	4	4	3	72	1	4	4
4	144	0	4	4	4	72	1	4	4
5	144	0	4	4	5	72	1	4	4
1	144	0	5	4	1	144	0	5	4
2	144	0	5	4	2	144	0	5	4
3	144	0	5	4	3	144	1	5	4
4	144	0	5	4	4	72	1	5	4
5	144	1	5	4	5	72	1	5	4
1	144	0	1	5	1	144	0	1	5
2	144	0	1	5	2	144	0	1	5
3	144	0	1	5	3	144	0	1	5
4	144	0	1	5	4	144	0	1	5
5	144	1	1	5	5	144	0	1	5

1	144	0	2	5	1	144	0	2	5
2	144	0	2	5	2	144	0	2	5
3	144	0	2	5	3	144	1	2	5
4	144	0	2	5	4	144	1	2	5
5	48	1	2	5	5	144	1	2	5
1	144	0	3	5	1	144	0	3	5
2	144	0	3	5	2	144	0	3	5
3	144	0	3	5	3	144	0	3	5
4	144	0	3	5	4	144	0	3	5
5	144	1	3	5	5	144	0	3	5
1	144	0	4	5	1	144	0	4	5
2	144	0	4	5	2	144	0	4	5
3	144	0	4	5	3	144	0	4	5
4	24	1	4	5	4	144	0	4	5
5	24	1	4	5	5	24	1	4	5
1	144	0	5	5	1	144	0	5	5
2	144	0	5	5	2	144	0	5	5
3	144	0	5	5	3	144	0	5	5
4	144	0	5	5	4	144	0	5	5
5	24	1	5	5	5	72	1	5	5
1	144	0	1	6	1	144	0	1	6
2	144	0	1	6	2	144	0	1	6
3	144	0	1	6	3	144	0	1	6
4	144	1	1	6	4	144	0	1	6
5	24	1	1	6	5	1	1	1	6
1	144	0	2	6	1	144	0	2	6
2	144	0	2	6	2	144	0	2	6
3	144	0	2	6	3	144	0	2	6
4	144	0	2	6	4	144	0	2	6
5	24	1	2	6	5	1	1	2	6
1	144	0	3	6	1	144	0	3	6
2	144	0	3	6	2	144	0	3	6
3	144	0	3	6	3	144	0	3	6
4	144	0	3	6	4	144	0	3	6
5	144	0	3	6	5	72	0	3	6
1	144	0	4	6	1	144	0	4	6
2	144	0	4	6	2	144	0	4	6
3	144	0	4	6	3	144	0	4	6
4	144	0	4	6	4	72	1	4	6
5	144	0	4	6	5	72	1	4	6
1	144	0	5	6	1	144	0	5	6
2	144	0	5	6	2	144	0	5	6
3	144	0	5	6	3	144	0	5	6
4	144	0	5	6	4	144	0	5	6
5	48	1	5	6	5	1	1	5	6
1	144	0	1	7	1	144	0	1	7
2	144	0	1	7	2	144	0	1	7
3	144	0	1	7	3	144	0	1	7
4	144	0	1	7	4	144	0	1	7
5	48	1	1	7	5	1	1	1	7
1	144	0	2	7	1	144	0	2	7
2	144	0	2	7	2	144	0	2	7
3	144	0	2	7	3	144	0	2	7
4	144	0	2	7	4	144	0	2	7

5	144	0	2	7	5	144	1	2	7
1	144	0	3	7	1	144	0	3	7
2	144	0	3	7	2	144	0	3	7
3	144	0	3	7	3	144	0	3	7
4	144	0	3	7	4	144	0	3	7
5	144	0	3	7	5	144	0	3	7
1	144	0	4	7	1	144	0	4	7
2	144	0	4	7	2	144	0	4	7
3	144	0	4	7	3	144	0	4	7
4	48	1	4	7	4	144	0	4	7
5	24	1	4	7	5	144	0	4	7
1	144	0	5	7	1	144	0	5	7
2	144	0	5	7	2	144	0	5	7
3	144	0	5	7	3	144	0	5	7
4	144	0	5	7	4	144	0	5	7
5	144	0	5	7	5	144	1	5	7

Nymph batch 8

Topical application					Surface residue				
Individual	Hour	Event	Rep	Treatment	Individual	Hour	Event	Rep	Treatment
1	168	0	1	1	1	168	0	1	1
2	168	0	1	1	2	168	0	1	1
3	168	0	1	1	3	168	0	1	1
4	168	0	1	1	4	168	1	1	1
5	168	1	1	1	5	168	1	1	1
1	168	0	2	1	1	168	0	2	1
2	168	0	2	1	2	168	0	2	1
3	168	0	2	1	3	168	0	2	1
4	168	0	2	1	4	168	0	2	1
5	168	1	2	1	5	168	0	2	1
1	168	0	3	1	1	168	0	3	1
2	168	0	3	1	2	168	0	3	1
3	168	0	3	1	3	168	0	3	1
4	168	1	3	1	4	168	0	3	1
5	24	1	3	1	5	1	1	3	1
1	168	0	4	1	1	168	0	4	1
2	168	0	4	1	2	168	0	4	1
3	168	1	4	1	3	168	0	4	1
4	72	1	4	1	4	168	0	4	1
5	72	1	4	1	5	168	0	4	1
1	168	0	5	1	1	168	0	5	1
2	168	0	5	1	2	168	0	5	1
3	168	0	5	1	3	168	0	5	1
4	72	1	5	1	4	168	0	5	1
5	72	1	5	1	5	168	1	5	1
1	168	0	1	2	1	168	0	1	2
2	24	1	1	2	2	168	1	1	2
3	1	1	1	2	3	24	1	1	2
4	1	1	1	2	4	24	1	1	2
5	1	1	1	2	5	1	1	1	2
1	168	1	2	2	1	168	1	2	2
2	168	1	2	2	2	168	1	2	2
3	72	1	2	2	3	168	1	2	2
4	24	1	2	2	4	1	1	2	2

5	1	1	2	2	5	1	1	2	2
1	168	0	3	2	1	96	1	3	2
2	24	1	3	2	2	1	1	3	2
3	24	1	3	2	3	1	1	3	2
4	24	1	3	2	4	1	1	3	2
5	1	1	3	2	5	1	1	3	2
1	168	0	4	2	1	168	0	4	2
2	1	1	4	2	2	96	1	4	2
3	1	1	4	2	3	24	1	4	2
4	1	1	4	2	4	24	1	4	2
5	1	1	4	2	5	1	1	4	2
1	168	0	5	2	1	168	0	5	2
2	1	1	5	2	2	168	0	5	2
3	1	1	5	2	3	168	1	5	2
4	1	1	5	2	4	24	1	5	2
5	1	1	5	2	5	24	1	5	2
1	168	0	1	3	1	96	0	1	3
2	168	0	1	3	2	96	1	1	3
3	168	0	1	3	3	24	1	1	3
4	72	1	1	3	4	1	1	1	3
5	24	1	1	3	5	1	1	1	3
1	168	0	2	3	1	24	1	2	3
2	168	0	2	3	2	24	1	2	3
3	72	1	2	3	3	24	1	2	3
4	72	1	2	3	4	1	1	2	3
5	1	1	2	3	5	1	1	2	3
1	168	0	3	3	1	24	0	3	3
2	168	0	3	3	2	1	1	3	3
3	72	1	3	3	3	1	1	3	3
4	24	1	3	3	4	1	1	3	3
5	1	1	3	3	5	1	1	3	3
1	168	0	4	3	1	24	1	4	3
2	168	1	4	3	2	24	1	4	3
3	72	1	4	3	3	24	1	4	3
4	72	1	4	3	4	1	1	4	3
5	72	1	4	3	5	1	1	4	3
1			5	3	1	168	0	5	3
2			5	3	2	168	0	5	3
3			5	3	3	24	1	5	3
4			5	3	4	24	1	5	3
5			5	3	5	24	1	5	3
1	168	0	1	4	1	168	0	1	4
2	168	0	1	4	2	96	1	1	4
3	168	0	1	4	3	96	1	1	4
4	168	0	1	4	4	24	1	1	4
5	168	1	1	4	5	1	1	1	4
1	168	0	2	4	1	168	0	2	4
2	168	0	2	4	2	168	0	2	4
3	168	0	2	4	3	96	1	2	4
4	168	1	2	4	4	24	1	2	4
5	168	1	2	4	5	24	1	2	4
1	168	0	3	4	1	168	0	3	4
2	168	0	3	4	2	168	0	3	4
3	168	0	3	4	3	168	0	3	4

4	168	0	3	4	4	168	0	3	4
5	1	1	3	4	5	1	1	3	4
1	168	0	4	4	1	168	0	4	4
2	168	0	4	4	2	168	0	4	4
3	168	0	4	4	3	168	1	4	4
4	168	1	4	4	4	24	1	4	4
5	24	1	4	4	5	24	1	4	4
1	168	0	5	4	1	168	0	5	4
2	168	0	5	4	2	168	0	5	4
3	168	0	5	4	3	168	0	5	4
4	24	1	5	4	4	168	1	5	4
5	1	1	5	4	5	168	1	5	4
1	168	0	1	5	1	168	0	1	5
2	168	0	1	5	2	168	1	1	5
3	168	0	1	5	3	168	1	1	5
4	168	0	1	5	4	72	1	1	5
5	72	1	1	5	5	72	1	1	5
1	168	0	2	5	1	168	0	2	5
2	168	0	2	5	2	168	0	2	5
3	168	0	2	5	3	168	1	2	5
4	168	1	2	5	4	168	1	2	5
5	168	1	2	5	5	24	1	2	5
1	168	0	3	5	1	168	0	3	5
2	168	0	3	5	2	168	0	3	5
3	168	1	3	5	3	168	0	3	5
4	72	1	3	5	4	168	1	3	5
5	1	1	3	5	5	72	1	3	5
1	168	0	4	5	1	168	0	4	5
2	168	0	4	5	2	168	0	4	5
3	168	0	4	5	3	168	1	4	5
4	168	1	4	5	4	24	1	4	5
5	72	1	4	5	5	24	1	4	5
1	168	0	5	5	1	168	0	5	5
2	168	0	5	5	2	168	0	5	5
3	168	0	5	5	3	168	0	5	5
4	168	1	5	5	4	168	1	5	5
5	168	1	5	5	5	72	1	5	5
1	168	0	1	6	1			1	6
2	168	0	1	6	2			1	6
3	168	1	1	6	3			1	6
4	168	1	1	6	4			1	6
5	168	1	1	6	5			1	6
1	168	0	2	6	1	168	0	2	6
2	168	0	2	6	2	72	1	2	6
3	168	0	2	6	3	72	1	2	6
4	168	0	2	6	4	24	1	2	6
5	168	1	2	6	5	1	1	2	6
1	168	0	3	6	1	168	0	3	6
2	168	0	3	6	2	168	1	3	6
3	168	0	3	6	3	72	1	3	6
4	168	1	3	6	4	24	1	3	6
5	168	1	3	6	5	24	1	3	6
1	168	0	4	6	1	72	1	4	6
2	168	0	4	6	2	72	1	4	6

3	168	0	4	6	3	72	1	4	6
4	168	1	4	6	4	24	1	4	6
5	24	1	4	6	5	24	1	4	6
1	168	0	5	6	1	168	0	5	6
2	168	0	5	6	2	168	0	5	6
3	168	1	5	6	3	72	1	5	6
4	72	1	5	6	4	72	1	5	6
5	24	1	5	6	5	24	1	5	6
1	168	0	1	7	1	168	0	1	7
2	168	0	1	7	2	168	0	1	7
3	168	0	1	7	3	168	0	1	7
4	168	0	1	7	4	168	1	1	7
5	168	1	1	7	5	72	1	1	7
1	168	0	2	7	1	72	1	2	7
2	168	0	2	7	2	24	1	2	7
3	168	0	2	7	3	24	1	2	7
4	168	0	2	7	4	24	1	2	7
5	168	1	2	7	5	24	1	2	7
1	168	0	3	7	1	168	0	3	7
2	168	0	3	7	2	168	0	3	7
3	168	0	3	7	3	168	0	3	7
4	168	0	3	7	4	168	1	3	7
5	168	1	3	7	5	72	1	3	7
1	168	0	4	7	1	168	0	4	7
2	168	0	4	7	2	168	0	4	7
3	168	0	4	7	3	168	1	4	7
4	168	1	4	7	4	72	1	4	7
5	72	1	4	7	5	24	1	4	7
1	168	0	5	7	1			5	7
2	168	0	5	7	2			5	7
3	168	0	5	7	3			5	7
4	168	1	5	7	4			5	7
5	168	1	5	7	5			5	7

Nymph batch 9

Topical application					Surface residue				
Individual	Hour	Event	Rep	Treatment	Individual	Hour	Event	Rep	Treatment
1	168	0	1	1	1	168	0	1	1
2	168	0	1	1	2	168	0	1	1
3	168	0	1	1	3	168	0	1	1
4	168	0	1	1	4	168	0	1	1
5	168	0	1	1	5	96	1	1	1
1	168	0	2	1	1	168	0	2	1
2	168	0	2	1	2	168	0	2	1
3	168	0	2	1	3	168	0	2	1
4	168	0	2	1	4	168	0	2	1
5	168	0	2	1	5	168	1	2	1
1	168	0	3	1	1	168	0	3	1
2	168	0	3	1	2	168	0	3	1
3	168	0	3	1	3	168	0	3	1
4	48	1	3	1	4	168	0	3	1
5	1	1	3	1	5	1	1	3	1
1	168	0	4	1	1	168	0	4	1
2	168	0	4	1	2	168	0	4	1

3	168	0	4	1	3	168	0	4	1
4	168	1	4	1	4	168	0	4	1
5	96	1	4	1	5	168	1	4	1
1	168	0	5	1	1	168	0	5	1
2	168	0	5	1	2	168	0	5	1
3	168	0	5	1	3	168	0	5	1
4	168	0	5	1	4	168	0	5	1
5	1	1	5	1	5	168	0	5	1
1	168	0	1	2	1	168	0	1	2
2	1	1	1	2	2	24	1	1	2
3	1	1	1	2	3	1	1	1	2
4	1	1	1	2	4	1	1	1	2
5	1	1	1	2	5	1	1	1	2
1	168	0	2	2	1	24	1	2	2
2	168	0	2	2	2	1	1	2	2
3	1	1	2	2	3	1	1	2	2
4	1	1	2	2	4	1	1	2	2
5	1	1	2	2	5	1	1	2	2
1	168	0	3	2	1	1	1	3	2
2	1	1	3	2	2	1	1	3	2
3	1	1	3	2	3	1	1	3	2
4	1	1	3	2	4	1	1	3	2
5	1	1	3	2	5	1	1	3	2
1	24	1	4	2	1	96	1	4	2
2	1	1	4	2	2	24	1	4	2
3	1	1	4	2	3	1	1	4	2
4	1	1	4	2	4	1	1	4	2
5	1	1	4	2	5	1	1	4	2
1	1	1	5	2	1	24	1	5	2
2	1	1	5	2	2	24	1	5	2
3	1	1	5	2	3	1	1	5	2
4	1	1	5	2	4	1	1	5	2
5	1	1	5	2	5	1	1	5	2
1	168	0	1	3	1	168	1	1	3
2	48	1	1	3	2	1	1	1	3
3	48	1	1	3	3	1	1	1	3
4	48	1	1	3	4	1	1	1	3
5	1	1	1	3	5	1	1	1	3
1	168	1	2	3	1	24	1	2	3
2	48	1	2	3	2	1	1	2	3
3	48	1	2	3	3	1	1	2	3
4	48	1	2	3	4	1	1	2	3
5	1	1	2	3	5	1	1	2	3
1	168	0	3	3	1	24	1	3	3
2	48	1	3	3	2	1	1	3	3
3	48	1	3	3	3	1	1	3	3
4	1	1	3	3	4	1	1	3	3
5	1	1	3	3	5	1	1	3	3
1	48	1	4	3	1	1	1	4	3
2	48	1	4	3	2	1	1	4	3
3	1	1	4	3	3	1	1	4	3
4	1	1	4	3	4	1	1	4	3
5	1	1	4	3	5	1	1	4	3
1	96	1	5	3	1	168	0	5	3

2	48	1	5	3	2	24	1	5	3
3	48	1	5	3	3	24	1	5	3
4	48	1	5	3	4	1	1	5	3
5	48	1	5	3	5	1	1	5	3
1	168	0	1	4	1	168	0	1	4
2	168	0	1	4	2	168	0	1	4
3	168	0	1	4	3	168	0	1	4
4	168	0	1	4	4	24	1	1	4
5	48	1	1	4	5	24	1	1	4
1	168	0	2	4	1	168	0	2	4
2	168	0	2	4	2	168	0	2	4
3	168	0	2	4	3	168	0	2	4
4	168	0	2	4	4	24	1	2	4
5	48	1	2	4	5	24	1	2	4
1	168	0	3	4	1	168	0	3	4
2	168	0	3	4	2	168	0	3	4
3	168	0	3	4	3	168	0	3	4
4	168	0	3	4	4	168	0	3	4
5	96	1	3	4	5	1	1	3	4
1	168	0	4	4	1	168	0	4	4
2	168	0	4	4	2	168	0	4	4
3	168	0	4	4	3	168	0	4	4
4	168	0	4	4	4	168	0	4	4
5	96	1	4	4	5	24	1	4	4
1	168	0	5	4	1	168	0	5	4
2	168	0	5	4	2	96	0	5	4
3	168	0	5	4	3	96	1	5	4
4	168	0	5	4	4	96	1	5	4
5	96	1	5	4	5	1	1	5	4
1	168	0	1	5	1	168	0	1	5
2	168	0	1	5	2	168	0	1	5
3	168	0	1	5	3	168	0	1	5
4	168	0	1	5	4	168	1	1	5
5	48	1	1	5	5	24	1	1	5
1	168	0	2	5	1	168	0	2	5
2	168	0	2	5	2	168	0	2	5
3	168	0	2	5	3	168	0	2	5
4	168	0	2	5	4	168	0	2	5
5	168	0	2	5	5	24	1	2	5
1	168	0	3	5	1	168	0	3	5
2	168	0	3	5	2	168	0	3	5
3	96	1	3	5	3	168	0	3	5
4	96	1	3	5	4	168	0	3	5
5	168	1	3	5	5	168	0	3	5
1	168	0	4	5	1	168	0	4	5
2	168	0	4	5	2	168	0	4	5
3	168	0	4	5	3	168	0	4	5
4	168	0	4	5	4	168	0	4	5
5	168	1	4	5	5	168	0	4	5
1	168	0	5	5	1	168	0	5	5
2	168	0	5	5	2	168	0	5	5
3	168	0	5	5	3	168	0	5	5
4	168	0	5	5	4	168	0	5	5
5	168	1	5	5	5	168	1	5	5

1	168	0	1	6	1	168	0	1	6
2	168	0	1	6	2	168	0	1	6
3	168	0	1	6	3	96	1	1	6
4	48	1	1	6	4	24	1	1	6
5	1	1	1	6	5	1	1	1	6
1	168	0	2	6	1	168	0	2	6
2	168	0	2	6	2	168	0	2	6
3	96	1	2	6	3	168	0	2	6
4	96	1	2	6	4	168	0	2	6
5	48	1	2	6	5	168	0	2	6
1	168	0	3	6	1	168	0	3	6
2	168	0	3	6	2	168	0	3	6
3	168	0	3	6	3	168	0	3	6
4	168	0	3	6	4	168	1	3	6
5	168	0	3	6	5	1	1	3	6
1	168	0	4	6	1	168	0	4	6
2	168	0	4	6	2	168	0	4	6
3	168	0	4	6	3	168	1	4	6
4	168	0	4	6	4	96	1	4	6
5	168	0	4	6	5	24	1	4	6
1	168	0	5	6	1	168	0	5	6
2	168	0	5	6	2	168	0	5	6
3	168	0	5	6	3	168	0	5	6
4	168	0	5	6	4	168	0	5	6
5	168	0	5	6	5	168	0	5	6
1	168	0	1	7	1	168	0	1	7
2	168	0	1	7	2	168	0	1	7
3	168	0	1	7	3	168	0	1	7
4	168	0	1	7	4	168	0	1	7
5	48	1	1	7	5	168	1	1	7
1	168	0	2	7	1	168	0	2	7
2	168	0	2	7	2	168	0	2	7
3	168	1	2	7	3	168	1	2	7
4	168	0	2	7	4	96	1	2	7
5	96	1	2	7	5	24	1	2	7
1	168	0	3	7	1	168	0	3	7
2	168	0	3	7	2	168	0	3	7
3	168	0	3	7	3	168	0	3	7
4	168	0	3	7	4	168	1	3	7
5	48	1	3	7	5	1	1	3	7
1	168	0	4	7	1	168	0	4	7
2	168	0	4	7	2	168	0	4	7
3	168	0	4	7	3	168	0	4	7
4	168	0	4	7	4	168	1	4	7
5	168	1	4	7	5	1	1	4	7
1	168	0	5	7	1	168	0	5	7
2	168	0	5	7	2	168	0	5	7
3	168	0	5	7	3	168	0	5	7
4	168	0	5	7	4	24	1	5	7
5	48	1	5	7	5	24	1	5	7

Nymph batch 10

Topical application					Surface residue				
Individual	Hour	Event	Rep	Treatment	Individual	Hour	Event	Rep	Treatment

1	168	0	1	1	1	168	0	1	1
2	168	0	1	1	2	168	0	1	1
3	168	0	1	1	3	168	0	1	1
4	168	0	1	1	4	168	0	1	1
5	168	0	1	1	5	168	1	1	1
1	168	0	2	1	1	168	0	2	1
2	168	0	2	1	2	168	0	2	1
3	168	0	2	1	3	168	0	2	1
4	168	0	2	1	4	168	0	2	1
5	168	0	2	1	5	168	1	2	1
1	168	0	3	1	1	168	0	3	1
2	168	0	3	1	2	168	0	3	1
3	168	0	3	1	3	168	0	3	1
4	168	1	3	1	4	168	1	3	1
5	168	1	3	1	5	72	1	3	1
1	168	0	4	1	1	168	0	4	1
2	168	0	4	1	2	168	0	4	1
3	168	0	4	1	3	168	0	4	1
4	168	0	4	1	4	168	1	4	1
5	168	0	4	1	5	1	1	4	1
1	168	0	5	1	1	168	0	5	1
2	168	0	5	1	2	168	0	5	1
3	168	0	5	1	3	168	0	5	1
4	168	0	5	1	4	168	0	5	1
5	72	1	5	1	5	24	1	5	1
1	168	0	1	2	1	168	1	1	2
2	168	0	1	2	2	72	1	1	2
3	168	0	1	2	3	24	1	1	2
4	72	1	1	2	4	24	1	1	2
5	1	1	1	2	5	1	1	1	2
1	168	0	2	2	1	168	0	2	2
2	1	1	2	2	2	168	1	2	2
3	1	1	2	2	3	168	1	2	2
4	1	1	2	2	4	72	1	2	2
5	1	1	2	2	5	24	1	2	2
1	168	0	3	2	1	168	1	3	2
2	1	1	3	2	2	72	1	3	2
3	1	1	3	2	3	72	1	3	2
4	1	1	3	2	4	1	1	3	2
5	1	1	3	2	5	1	1	3	2
1	1	1	4	2	1	168	0	4	2
2	1	1	4	2	2	168	1	4	2
3	1	1	4	2	3	1	1	4	2
4	1	1	4	2	4	1	1	4	2
5	1	1	4	2	5	1	1	4	2
1	168	0	5	2	1	168	1	5	2
2	1	1	5	2	2	168	1	5	2
3	1	1	5	2	3	168	1	5	2
4	1	1	5	2	4	72	1	5	2
5	1	1	5	2	5	24	1	5	2
1	168	0	1	3	1	168	0	1	3
2	168	1	1	3	2	168	0	1	3
3	72	1	1	3	3	72	1	1	3
4	72	1	1	3	4	24	1	1	3

5	24	1	1	3	5	1	1	1	3
1	168	0	2	3	1	168	0	2	3
2	24	1	2	3	2	168	0	2	3
3	1	1	2	3	3	168	1	2	3
4	1	1	2	3	4	24	1	2	3
5	1	1	2	3	5	24	1	2	3
1	168	1	3	3	1	168	0	3	3
2	72	1	3	3	2	168	0	3	3
3	24	1	3	3	3	168	0	3	3
4	1	1	3	3	4	72	1	3	3
5	1	1	3	3	5	1	1	3	3
1	168	0	4	3	1	168	0	4	3
2	72	1	4	3	2	168	0	4	3
3	1	1	4	3	3	168	0	4	3
4	1	1	4	3	4	168	1	4	3
5	1	1	4	3	5	24	1	4	3
1	168	0	5	3	1	168	0	5	3
2	72	1	5	3	2	168	0	5	3
3	72	1	5	3	3	168	1	5	3
4	24	1	5	3	4	168	1	5	3
5	1	1	5	3	5	1	1	5	3
1	168	0	1	4	1	168	0	1	4
2	168	0	1	4	2	168	0	1	4
3	168	0	1	4	3	168	0	1	4
4	168	0	1	4	4	168	1	1	4
5	168	0	1	4	5	24	1	1	4
1	168	0	2	4	1	168	0	2	4
2	168	0	2	4	2	168	0	2	4
3	168	0	2	4	3	168	1	2	4
4	168	1	2	4	4	72	1	2	4
5	72	1	2	4	5	24	1	2	4
1	168	0	3	4	1	168	0	3	4
2	168	0	3	4	2	168	0	3	4
3	168	0	3	4	3	168	0	3	4
4	168	1	3	4	4	168	0	3	4
5	72	1	3	4	5	168	1	3	4
1	168	0	4	4	1	168	0	4	4
2	168	0	4	4	2	168	0	4	4
3	168	0	4	4	3	168	0	4	4
4	168	0	4	4	4	168	0	4	4
5	72	1	4	4	5	168	1	4	4
1	168	0	5	4	1	168	0	5	4
2	168	0	5	4	2	168	0	5	4
3	168	0	5	4	3	168	1	5	4
4	168	0	5	4	4	1	1	5	4
5	72	1	5	4	5	1	1	5	4
1	168	0	1	5	1	168	0	1	5
2	168	0	1	5	2	168	0	1	5
3	168	0	1	5	3	168	0	1	5
4	168	0	1	5	4	168	0	1	5
5	72	1	1	5	5	168	0	1	5
1	168	0	2	5	1	168	0	2	5
2	168	0	2	5	2	168	0	2	5
3	168	0	2	5	3	168	0	2	5

4	168	1	2	5	4	168	0	2	5
5	24	1	2	5	5	168	0	2	5
1	168	0	3	5	1	168	0	3	5
2	168	0	3	5	2	168	0	3	5
3	168	0	3	5	3	168	0	3	5
4	168	1	3	5	4	168	0	3	5
5	1	1	3	5	5	168	1	3	5
1	168	0	4	5	1	168	0	4	5
2	168	0	4	5	2	168	0	4	5
3	168	0	4	5	3	168	1	4	5
4	24	1	4	5	4	168	1	4	5
5	24	1	4	5	5	24	1	4	5
1	168	0	5	5	1	168	0	5	5
2	168	0	5	5	2	168	0	5	5
3	168	0	5	5	3	168	0	5	5
4	168	1	5	5	4	168	1	5	5
5	24	1	5	5	5	168	1	5	5
1	168	0	1	6	1	168	0	1	6
2	168	0	1	6	2	168	0	1	6
3	168	0	1	6	3	168	0	1	6
4	168	0	1	6	4	168	1	1	6
5	168	0	1	6	5	168	1	1	6
1	168	0	2	6	1	168	0	2	6
2	168	0	2	6	2	168	0	2	6
3	168	1	2	6	3	168	0	2	6
4	168	1	2	6	4	168	1	2	6
5	24	1	2	6	5	168	1	2	6
1	168	0	3	6	1	168	0	3	6
2	168	0	3	6	2	168	0	3	6
3	168	0	3	6	3	168	0	3	6
4	168	0	3	6	4	168	1	3	6
5	168	1	3	6	5	168	1	3	6
1	168	0	4	6	1	168	0	4	6
2	168	0	4	6	2	168	0	4	6
3	168	0	4	6	3	168	0	4	6
4	168	1	4	6	4	168	1	4	6
5	168	1	4	6	5	168	1	4	6
1	168	0	5	6	1	168	0	5	6
2	168	0	5	6	2	168	0	5	6
3	168	0	5	6	3	168	0	5	6
4	168	0	5	6	4	168	0	5	6
5	168	0	5	6	5	24	1	5	6
1	168	0	1	7	1	168	0	1	7
2	168	0	1	7	2	168	0	1	7
3	168	0	1	7	3	168	0	1	7
4	168	0	1	7	4	168	0	1	7
5	1	1	1	7	5	168	1	1	7
1	168	0	2	7	1	168	0	2	7
2	168	0	2	7	2	168	0	2	7
3	168	0	2	7	3	168	0	2	7
4	72	1	2	7	4	168	0	2	7
5	1	1	2	7	5	168	1	2	7
1	168	0	3	7	1	168	0	3	7
2	168	0	3	7	2	168	0	3	7

3	168	0	3	7	3	168	0	3	7
4	168	0	3	7	4	168	0	3	7
5	24	1	3	7	5	72	1	3	7
1	168	0	4	7	1	168	0	4	7
2	168	0	4	7	2	168	0	4	7
3	168	0	4	7	3	168	0	4	7
4	168	0	4	7	4	168	0	4	7
5	1	1	4	7	5	72	1	4	7
1	168	0	5	7	1	168	0	5	7
2	168	0	5	7	2	168	0	5	7
3	168	0	5	7	3	168	0	5	7
4	72	1	5	7	4	72	1	5	7
5	1	1	5	7	5	72	1	5	7

Nymph batch 11

Topical application					Surface residue				
Individual	Hour	Event	Rep	Treatment	Individual	Hour	Event	Rep	Treatment
1	168	0	1	1	1	168	0	1	1
2	168	0	1	1	2	168	0	1	1
3	168	0	1	1	3	168	0	1	1
4	168	0	1	1	4	168	0	1	1
5	168	0	1	1	5	168	0	1	1
1	168	0	2	1	1	168	0	2	1
2	168	0	2	1	2	168	0	2	1
3	168	0	2	1	3	168	0	2	1
4	168	1	2	1	4	168	0	2	1
5	72	1	2	1	5	168	1	2	1
1	168	0	3	1	1	168	0	3	1
2	168	0	3	1	2	168	0	3	1
3	168	0	3	1	3	168	0	3	1
4	168	0	3	1	4	168	0	3	1
5	72	1	3	1	5	168	1	3	1
1	168	0	4	1	1	168	0	4	1
2	168	0	4	1	2	168	0	4	1
3	168	0	4	1	3	168	0	4	1
4	168	0	4	1	4	168	0	4	1
5	168	0	4	1	5	72	1	4	1
1	168	0	5	1	1	168	0	5	1
2	168	0	5	1	2	168	0	5	1
3	168	0	5	1	3	168	0	5	1
4	72	1	5	1	4	168	0	5	1
5	72	1	5	1	5	72	1	5	1
1	1	1	1	2	1	72	1	1	2
2	1	1	1	2	2	72	1	1	2
3	1	1	1	2	3	24	1	1	2
4	1	1	1	2	4	24	1	1	2
5	1	1	1	2	5	1	1	1	2
1	1	1	2	2	1	72	1	2	2
2	1	1	2	2	2	72	1	2	2
3	1	1	2	2	3	24	1	2	2
4	1	1	2	2	4	24	1	2	2
5	1	1	2	2	5	1	1	2	2
1	1	1	3	2	1	24	1	3	2
2	1	1	3	2	2	24	1	3	2

3	1	1	3	2	3	1	1	3	2
4	1	1	3	2	4	1	1	3	2
5	1	1	3	2	5	1	1	3	2
1	1	1	4	2	1	168	0	4	2
2	1	1	4	2	2	72	1	4	2
3	1	1	4	2	3	24	1	4	2
4	1	1	4	2	4	24	1	4	2
5	1	1	4	2	5	1	1	4	2
1	1	1	5	2	1	168	1	5	2
2	1	1	5	2	2	168	1	5	2
3	1	1	5	2	3	168	1	5	2
4	1	1	5	2	4	72	1	5	2
5	1	1	5	2	5	24	1	5	2
1	168	1	1	3	1	168	0	1	3
2	24	1	1	3	2	168	0	1	3
3	24	1	1	3	3	168	0	1	3
4	1	1	1	3	4	168	0	1	3
5	1	1	1	3	5	24	1	1	3
1	72	1	2	3	1	168	0	2	3
2	24	1	2	3	2	168	0	2	3
3	24	1	2	3	3	72	1	2	3
4	1	1	2	3	4	72	1	2	3
5	1	1	2	3	5	1	1	2	3
1	24	1	3	3	1	168	0	3	3
2	24	1	3	3	2	168	0	3	3
3	1	1	3	3	3	72	1	3	3
4	1	1	3	3	4	72	1	3	3
5	1	1	3	3	5	1	1	3	3
1	24	1	4	3	1	168	0	4	3
2	24	1	4	3	2	168	0	4	3
3	24	1	4	3	3	168	1	4	3
4	24	1	4	3	4	168	1	4	3
5	1	1	4	3	5	24	1	4	3
1	24	1	5	3	1	168	0	5	3
2	1	1	5	3	2	168	0	5	3
3	1	1	5	3	3	168	0	5	3
4	1	1	5	3	4	24	1	5	3
5	1	1	5	3	5	1	1	5	3
1	168	0	1	4	1	168	1	1	4
2	168	0	1	4	2	168	1	1	4
3	168	1	1	4	3	168	1	1	4
4	168	1	1	4	4	1	1	1	4
5	1	1	1	4	5	1	1	1	4
1	168	0	2	4	1	168	0	2	4
2	168	0	2	4	2	168	0	2	4
3	168	1	2	4	3	168	1	2	4
4	72	1	2	4	4	168	1	2	4
5	24	1	2	4	5	1	1	2	4
1	168	0	3	4	1	168	0	3	4
2	168	0	3	4	2	168	0	3	4
3	168	1	3	4	3	168	0	3	4
4	168	1	3	4	4	168	1	3	4
5	1	1	3	4	5	168	1	3	4
1	168	0	4	4	1	168	0	4	4

2	168	1	4	4	2	168	0	4	4
3	168	1	4	4	3	168	0	4	4
4	72	1	4	4	4	168	1	4	4
5	1	1	4	4	5	168	1	4	4
1	168	0	5	4	1	168	0	5	4
2	168	1	5	4	2	168	0	5	4
3	168	1	5	4	3	168	0	5	4
4	1	1	5	4	4	168	0	5	4
5	1	1	5	4	5	168	1	5	4
1	168	0	1	5	1	168	0	1	5
2	168	0	1	5	2	168	0	1	5
3	168	0	1	5	3	168	0	1	5
4	168	1	1	5	4	168	0	1	5
5	1	1	1	5	5	168	0	1	5
1	168	0	2	5	1	168	1	2	5
2	168	0	2	5	2	168	1	2	5
3	168	0	2	5	3	168	1	2	5
4	168	0	2	5	4	168	1	2	5
5	168	0	2	5	5	24	1	2	5
1	168	0	3	5	1	168	1	3	5
2	168	0	3	5	2	168	1	3	5
3	168	0	3	5	3	168	1	3	5
4	168	0	3	5	4	168	1	3	5
5	168	1	3	5	5	168	1	3	5
1	168	0	4	5	1	168	1	4	5
2	168	0	4	5	2	168	1	4	5
3	168	0	4	5	3	168	1	4	5
4	168	1	4	5	4	168	1	4	5
5	72	1	4	5	5	168	1	4	5
1	168	0	5	5	1	168	1	5	5
2	168	0	5	5	2	168	1	5	5
3	168	0	5	5	3	168	1	5	5
4	168	0	5	5	4	168	1	5	5
5	168	1	5	5	5	168	1	5	5
1	168	0	1	6	1	168	0	1	6
2	72	1	1	6	2	168	0	1	6
3	72	1	1	6	3	168	1	1	6
4	72	1	1	6	4	168	1	1	6
5	1	1	1	6	5	168	1	1	6
1	168	0	2	6	1	168	0	2	6
2	168	0	2	6	2	168	0	2	6
3	168	0	2	6	3	168	0	2	6
4	168	0	2	6	4	168	1	2	6
5	168	1	2	6	5	168	1	2	6
1	168	0	3	6	1	168	1	3	6
2	168	1	3	6	2	168	1	3	6
3	72	1	3	6	3	168	1	3	6
4	72	1	3	6	4	168	1	3	6
5	24	1	3	6	5	24	1	3	6
1	168	0	4	6	1	168	0	4	6
2	168	0	4	6	2	168	1	4	6
3	168	1	4	6	3	168	1	4	6
4	72	1	4	6	4	168	1	4	6
5	24	1	4	6	5	168	1	4	6

1	168	0	5	6	1	168	0	5	6
2	168	0	5	6	2	168	0	5	6
3	168	1	5	6	3	168	0	5	6
4	168	1	5	6	4	168	0	5	6
5	168	1	5	6	5	168	1	5	6
1	168	0	1	7	1	168	0	1	7
2	168	0	1	7	2	168	1	1	7
3	168	0	1	7	3	168	1	1	7
4	168	0	1	7	4	168	1	1	7
5	24	1	1	7	5	1	1	1	7
1	168	0	2	7	1	168	0	2	7
2	168	0	2	7	2	168	0	2	7
3	168	0	2	7	3	168	0	2	7
4	168	0	2	7	4	168	0	2	7
5	168	0	2	7	5	168	1	2	7
1	168	0	3	7	1	168	0	3	7
2	168	0	3	7	2	168	0	3	7
3	168	0	3	7	3	168	0	3	7
4	72	1	3	7	4	168	1	3	7
5	24	1	3	7	5	24	1	3	7
1	168	0	4	7	1	168	1	4	7
2	168	0	4	7	2	168	1	4	7
3	168	1	4	7	3	168	1	4	7
4	72	1	4	7	4	168	1	4	7
5	24	1	4	7	5	168	1	4	7
1	168	0	5	7	1	168	1	5	7
2	168	1	5	7	2	168	1	5	7
3	72	1	5	7	3	168	1	5	7
4	72	1	5	7	4	168	1	5	7
5	1	1	5	7	5	168	1	5	7

b. Summary of analyses

The Hazard ratios (HR) indicate the relative average daily risk of death compared to the water treated control. The mean survival time (MST) gives the proportional cumulative survival of 50% of the populations.

^a hpi = hours post inoculation

^b MST = mean survival time, given in hours

^c HR = hazard ratio, compared to the water control

Adult batch 1 - topical application

Treatment	% Mortality at 1hpi ^a	% Mortality at 24hpi ^a	Factors	MST ^b (95% CI)	HR ^c (95% CI)	Z (HR)	P (HR)	df	n
			Treatment			44.47	<0.001	6	7
Control	4	12		107 (85 - 130)					25
Pyrethrum 5EC	100	100		1 (1 - 1)	9.37 (4.67 - 18.80)	39.73	<0.001	1	25
Spruzit	44	64		35 (19 - 51)	2.98 (1.65 - 5.40)	12.98	<0.001	1	25
AHDB9967	8	16		62 (53 - 71))	1.91 (1.03 - 3.57)	4.15	0.042	1	25
AHDB9735	24	24		55 (43 - 67)	2.09 (1.12 - 3.89)	5.33	0.021	1	25
AHDB9971	20	28		65 (48 - 83)	2.03 (1.10 - 3.75)	5.08	0.024	1	25
AHDB9736	32	36		47 (34 - 60)	2.37 (1.27 - 4.41)	7.32	0.007	1	25

Adult batch 2 - surface residue

Treatment	% Mortality at 1hpi ^a	% Mortality at 24hpi ^a	Factors	MST ^b (95% CI)	HR ^c (95% CI)	Z (HR)	P (HR)	df	n
			Treatment			52.48	<0.001	6	7
Control	0	0		141 (135 - 147)					25
Pyrethrum 5EC	40	96		20 (9 - 31)	5.69 (3.12 - 10.35)	32.32	<0.001	1	25
Spruzit	32	80		38 (18 - 57)	3.33 (1.87 - 5.93)	16.64	<0.001	1	25
AHDB9967	4	20		85 (66 - 103)	1.71 (0.96 - 3.05)	3.32	0.069	1	25
AHDB9735	24	44		54 (36 - 72)	2.89 (1.62 - 5.13)	13.03	<0.001	1	25
AHDB9971	4	8		128 (112 - 144)	0.83(0.45 - 1.53)	0.36	0.548	1	25
AHDB9736	12	36		78 (56 - 100)	1.93 (1.10 - 3.38)	5.19	0.023	1	25

Adult batch 3 - topical application

Treatment	% Mortality at 1hpi ^a	% Mortality at 24hpi ^a	Factors	MST ^b (95% CI)	HR ^c (95% CI)	Z (HR)	P (HR)	df	n
Control	4	12	Treatment	123 (105 - 141)		43.41	<0.001	6	7
Pyrethrum 5EC	88	88		18 (0 - 37)	7.49 (3.28 - 17.13)	22.78	<0.001	1	25
Spruzit	16	68		55 (33 - 77)	3.97 (1.75 - 9.01)	10.85	0.001	1	25
AHDB9967	16	20		112 (90 - 135)	1.45 (0.58 - 3.61)	0.64	0.423	1	25
AHDB9735	12	24		111 (87 - 134)	1.06 (0.40 - 2.82)	0.01	0.912	1	25
AHDB9971	12	20		104 (83 - 125)	2.24 (0.96 - 5.23)	3.46	0.063	1	25
AHDB9736	24	28		99 (74 - 124)	1.88 (0.78 - 4.53)	1.96	0.162	1	25

Adult batch 3 - surface residue

Treatment	% Mortality at 1hpi ^a	% Mortality at 24hpi ^a	Factors	MST ^b (95% CI)	HR ^c (95% CI)	Z (HR)	P (HR)	df	n
Control	4	8	Treatment	126 (108 - 143) a		9.59	0.143	6	7
Pyrethrum 5EC	20	24		99 (74 - 124) b	2.16 (1.03 - 4.53)	4.11	0.043	1	25
Spruzit	8	16		123 (103 - 143) a	1.12 (0.49 - 2.53)	0.07	0.792	1	25
AHDB9967	0	8		104 (84 - 124) b	1.87 (0.87 - 3.99)	2.59	0.108	1	25
AHDB9735	0	0		132 (120 - 145) a	1.30 (0.60 - 2.82)	0.43	0.513	1	25
AHDB9971	0	4		120 (102 - 138) a	0.98 (0.42 - 2.31)	0	0.967	1	25
AHDB9736	0	8		131 (116 - 146) a	0.97 (0.42 - 2.23)	0.01	0.939	1	25

Adult batch 4 - topical application

Treatment	% Mortality at 1hpi ^a	% Mortality at 24hpi ^a	Factors	MST ^b (95% CI)	HR ^c (95% CI)	Z (HR)	P (HR)	df	n
Control	5	15	Treatment	84 (71 - 97)		41.01	<0.001	6	7
Pyrethrum 5EC	100	100		1 (1 - 1)	10.34 (4.52 - 23.67)	30.56	<0.001	1	20
Spruzit	5	45		62 (45 - 79)	1.08 (0.55 - 2.12)	0.04	0.833	1	20
AHDB9967	25	30		69 (50 - 88)	1.07 (0.56 - 2.06)	0.04	0.84	1	20
AHDB9735	20	30		70 (52 - 88)	1.25 (0.67 - 2.34)	0.47	0.491	1	20
AHDB9971	5	15		84 (71 - 97)	0.95 (0.50 - 1.81)	0.03	0.869	1	20
AHDB9736	5	5		92 (85 - 99)	0.86 (0.45 - 1.65)	0.2	0.657	1	20

Adult batch 4 - surface residue

Treatment	% Mortality at 1hpi ^a	% Mortality at 24hpi ^a	Factors	MST ^b (95% CI)	HR ^c (95% CI)	Z (HR)	P (HR)	df	n
Control	0	12	Treatment	87 (78 - 97)		7.75	0.257	6	7
Pyrethrum 5EC	4	60		52 (37 - 66)	1.74 (0.10 - 3.05)	3.83	0.05	1	25
Spruzit	0	24		79 (66 - 91)	1.12 (0.64 - 1.94)	0.15	0.696	1	25
AHDB9967	4	36		69 (55 - 84)	1.28 (0.73 - 2.23)	0.75	0.386	1	25
AHDB9735	0	24		79 (66 - 91)	1.12 (0.64 - 1.94)	0.15	0.696	1	25
AHDB9971	8	16		83 (70 - 95)	0.97 (0.55 - 1.71)	0.01	0.917	1	25
AHDB9736	0	12		87 (78 - 97)	0.84 (0.47 - 1.50)	0.35	0.556	1	25

Adult batch 5 - topical application

Treatment	% Mortality at 1hpi ^a	% Mortality at 24hpi ^a	Factors	MST ^b (95% CI)	HR ^c (95% CI)	Z (HR)	P (HR)	df	n
Control	0	12	Treatment	143 (122 - 163)		54.14	<0.001	6	7
Pyrethrum 5EC	98	100		4 (1 - 7)	12.40 (5.72 - 26.91)	40.57	<0.001	1	25
Spruzit	24	48		75 (47 - 103)	2.05 (1.06 - 3.95)	4.55	0.033	1	25
AHDB9967	20	28		113 (84 - 141)	1.40 (0.73 - 2.70)	1.03	0.311	1	25
AHDB9735	8	16		126 (103 - 149)	1.45 (0.76 - 2.74)	1.28	0.258	1	25
AHDB9971	4	16		126 (102 - 150)	1.35 (0.71 - 2.58)	0.83	0.361	1	25
AHDB9736	8	12		140 (121 - 160)	0.86 (0.42 - 1.74)	0.18	0.675	1	25

Adult batch 5 - surface residue

Treatment	% Mortality at 1hpi ^a	% Mortality at 24hpi ^a	Factors	MST ^b (95% CI)	HR ^c (95% CI)	Z (HR)	P (HR)	df	n
Control	0	4	Treatment	147 (130 - 164)		51.07	<0.001	6	7
Pyrethrum 5EC	68	88		14 (5 - 23)	6.44 (3.40 - 12.23)	32.48	<0.001	1	25
Spruzit	28	80		39 (18 - 59)	3.53 (1.93 - 6.46)	16.77	<0.001	1	25
Orange	16	36		97 (69 - 126)	1.50 (0.82 - 2.78)	1.7	0.192	1	25
IN021	0	20		108 (85 - 132)	1.39 (0.75 - 2.56)	1.08	0.299	1	25
Azatin	16	28		116 (88 - 145)	1.10 (0.58 - 2.08)	0.08	0.771	1	25
IN020	8	32		112 (84 - 140)	1.31 (0.71 - 2.42)	0.76	0.383	1	25

Adult batch 6 - topical application

Treatment	% Mortality at 1hpi ^a	% Mortality at 24hpi ^a	Factors	MST ^b (95% CI)	HR ^c (95% CI)	Z (HR)	P (HR)	df	n
Control	4	20	Treatment	102 (81 - 122)		48.52	<0.001	6	7
Pyrethrum 5EC	76	84		14 (4 - 25)	6.01 (3.17 - 11.41)	30.19	<0.001	1	25
Spruzit	16	64		52 (32 - 72)	2.23 (1.20 - 4.15)	6.42	0.011	1	25
AHDB9967	16	36		77 (55 - 99)	1.43 (0.76 - 2.70)	1.2	0.273	1	25
AHDB9735	4	16		112 (93 - 132)	0.91 (0.47 - 1.75)	0.08	0.777	1	25
AHDB9971	4	20		108 (87 - 128)	1.10 (0.59 - 2.07)	0.09	0.76	1	25
AHDB9736	8	28		88 (67 - 110)	1.45 (0.78 - 2.69)	1.41	0.235	1	25

Nymph batch 7 - topical application

Treatment	% Mortality at 1hpi ^a	% Mortality at 24hpi ^a	Factors	MST ^b (95% CI)	HR ^c (95% CI)	Z (HR)	P (HR)	df	n
Control	0	4	Treatment	139 (128 - 150)		11.56	0.073	6	7
Pyrethrum 5EC	16	20		116 (93 - 139)	4.26 (1.19 - 15.28)	4.95	0.026	1	25
Spruzit	12	36		98 (74 - 122)	3.92 (1.06 - 14.50)	4.19	0.041	1	25
AHDB9967	0	12		122 (103 - 141)	2.14 (0.54 - 8.56)	1.16	0.282	1	25
AHDB9735	0	12		126 (108 - 144)	2.11 (0.53 - 8.44)	1.12	0.291	1	25
AHDB9971	0	8		131 (114 - 147)	1.38 (0.31 - 6.16)	0.18	0.674	1	25
AHDB9736	0	4		132 (118 - 144)	1.03 (0.21 - 5.09)	0	0.974	1	25

Nymph batch 7 - surface residue

Treatment	% Mortality at 1hpi ^a	% Mortality at 24hpi ^a	Factors	MST ^b (95% CI)	HR ^c (95% CI)	Z (HR)	P (HR)	df	n
Control	0	0	Treatment	144 (144 - 144)		38.35	<0.001	6	7
Pyrethrum									25
5EC	32	40		68 (45 - 92)	33.90 (4.55 - 252.8)	11.81	0.001	1	25
Spruzit	20	36		93 (67 - 119)	14.89 (1.92 - 115.4)	6.68	0.01	1	25
AHDB9967	12	12		112 (92 - 133)	13.03 (1.68 - 101.0)	6.04	0.014	1	25
AHDB9735	0	4		136 (125 - 148)	5.20 (0.61 - 44.51)	2.27	0.132	1	25
AHDB9971	12	12		121 (102 - 140)	5.74 (0.67 - 49.15)	2.55	0.111	1	25
AHDB9736	4	4		138 (125 - 152)	3.09 (0.32 - 29.72)	0.96	0.328	1	25

Nymph batch 8 - topical application

Treatment	% Mortality at 1hpi ^a	% Mortality at 24hpi ^a	Factors	MST ^b (95% CI)	HR ^c (95% CI)	Z (HR)	P (HR)	df	n
Control	0	4	Treatment	147 (129 - 165)		39.95	<0.001	6	7
Pyrethrum									25
5EC	52	72		49 (21 - 76)	5.28 (2.40 - 11.63)	17.03	<0.001	1	25
Spruzit	10	20		103 (75 - 132)	2.22 (0.93 - 5.27)	3.24	0.072	1	20
AHDB9967	8	16		143 (119 - 167)	0.91 (0.35 - 2.35)	0.04	0.841	1	25
AHDB9735	4	4		150 (132 - 168)	1.09 (0.44 - 2.69)	0.04	0.846	1	25
AHDB9971	0	8		153 (135 - 170)	1.18 (0.49 - 2.85)	0.14	0.71	1	25
AHDB9736	0	0		164 (156 - 172)	0.71 (0.26 - 1.90)	0.47	0.494	1	25

Nymph batch 8 - surface residue

Treatment	% Mortality at 1hpi ^a	% Mortality at 24hpi ^a	Factors	MST ^b (95% CI)	HR ^c (95% CI)	Z (HR)	P (HR)	df	n
Control	4	4	Treatment	161 (147 - 176) a		36.72	<0.001	6	7
Pyrethrum									25
5EC	32	56		74 (44 - 104) b	9.41 (3.22 - 27.48)	16.8	<0.001	1	25
Spruzit	40	80		40 (17 - 63) b	14.82 (5.01 - 43.82)	23.75	<0.001	1	25
AHDB9967	8	28		117 (14 - 90)	4.13 (1.34 - 12.66)	6.14	0.013	1	25
AHDB9735	0	12		135 (113 - 157)	3.96 (1.30 - 12.04)	5.89	0.015	1	25
AHDB9971	5	35		78 (52 - 104) b	8.21 (2.73 - 24.71)	14.03	<0.001	1	20
AHDB9736	0	25		113 (84 - 142)	4.81 (1.55 - 14.93)	7.38	0.007	1	20

Nymph batch 9 - topical application

Treatment	% Mortality at 1hpi ^a	% Mortality at 24hpi ^a	Factors	MST ^b (95% CI)	HR ^c (95% CI)	Z (HR)	P (HR)	df	n
Control	8	8	Treatment	147 (125 - 169)		70.45	<0.001	6	7
Pyrethrum									25
5EC	80	84		29 (5 - 53)	10.86 (4.01 - 29.39)	22.03	<0.001	1	25
Spruzit	72	72		51 (31 - 71)	7.75 (2.91 - 20.66)	16.74	<0.001	1	25
AHDB9967	0	0		150 (135 - 165)	0.97 (0.28 - 3.34)	0	0.959	1	25
AHDB9735	0	0		157 (145 - 170)	1.13 (0.35 - 3.71)	0.04	0.837	1	25
AHDB9971	4	4		146 (128 - 164)	0.99 (0.29 - 3.43)	0	0.991	1	25
AHDB9736	0	0		151 (133 - 168)	1.16 (0.36 - 3.82)	0.06	0.802	1	25

Nymph batch 9 - surface residue

Treatment	% Mortality at 1hpi ^a	% Mortality at 24hpi ^a	Factors	MST ^b (95% CI)	HR ^c (95% CI)	Z (HR)	P (HR)	df	n
Control	4	4	Treatment	158 (143 - 174)		73.22	<0.001	6	7
Pyrethrum									25
5EC	72	92		16 (2 - 31)	15.92 (5.37 - 47.19)	24.94	<0.001	1	25
Spruzit	76	92		18 (0 - 36)	15.93 (5.39 - 47.09)	25.05	<0.001	1	25
AHDB9967	8	28		120 (94 - 147)	2.65 (0.81 - 8.60)	2.62	0.106	1	25
AHDB9735	8	16		156 (139 - 174)	1.00 (0.25 - 3.98)	0	0.994	1	25
AHDB9971	8	16		137 (113 - 162)	0.20 (0.66 - 7.23)	1.61	0.204	1	25
AHDB9736	8	20		134 (109 - 160)	2.74 (0.86 - 8.74)	2.9	0.088	1	25

Nymph batch 10 - topical application

Treatment	% Mortality at 1hpi ^a	% Mortality at 24hpi ^a	Factors	MST ^b (95% CI)	HR ^c (95% CI)	Z (HR)	P (HR)	df	n
Control	0	0	Treatment	164 (155 - 173)		49	<0.001	6	7
Pyrethrum									25
5EC	72	72		44 (16 - 72)	13.11 (3.84 - 44.73)	16.89	<0.001	1	25
Spruzit	36	52		62 (35 - 88)	11.87 (3.52 - 40.04)	15.91	<0.001	1	25
AHDB9967	0	0		153 (138 - 168)	2.08 (0.52 - 8.30)	1.07	0.301	1	25
AHDB9735	4	20		134 (109 - 160)	3.41 (0.92 - 12.59)	3.38	0.066	1	25
AHDB9971	0	4		162 (150 - 174)	2.02 (0.51 - 8.08)	0.99	0.32	1	25
AHDB9736	16	20		128 (102 - 154)	2.74 (0.71 - 10.62)	2.14	0.144	1	25

Nymph batch 10 - surface residue

Treatment	% Mortality at 1hpi ^a	% Mortality at 24hpi ^a	Factors	MST ^b (95% CI)	HR ^c (95% CI)	Z (HR)	P (HR)	df	n
Control	4	8	Treatment	152 (133 - 171)		37.47	<0.001	6	7
Pyrethrum									25
5EC	24	40		86 (57 - 114)	5.36 (2.29 - 12.53)	15.02	<0.001	1	25
Spruzit	12	28		117 (89 - 146)	2.32 (0.92 - 5.80)	3.2	0.074	1	25
AHDB9967	8	16		139 (115 - 163)	1.54 (0.59 - 4.04)	0.76	0.83	1	25
AHDB9735	0	4		162 (150 - 174)	0.81 (0.27 - 2.40)	0.15	0.699	1	25
AHDB9971	0	4		162 (150 - 174)	1.21 (0.45 - 3.25)	0.14	0.706	1	25
AHDB9736	0	0		153 (138 - 168)	0.86 (0.29 - 2.56)	0.07	0.786	1	25

Nymph batch 11 - topical application

Treatment	% Mortality at 1hpi ^a	% Mortality at 24hpi ^a	Factors	MST ^b (95% CI)	HR ^c (95% CI)	Z (HR)	P (HR)	df	n
Control	0	0	Treatment	153 (137 - 168)a		87.41	<0.001	6	7
Pyrethrum									25
5EC	100	100		1 (1 - 1)b	40.01 (13.57 - 117.95)	44.74	<0.001	1	25
Spruzit	48	92		21 (7 - 34)c	19.87 (7.30 - 54.09)	34.24	<0.001	1	25
AHDB9967	20	24		121 (93 - 150)d	4.16 (1.54 - 11.28)	7.86	0.005	1	25
AHDB9735	4	4		157 (142 - 173)ae	1.18 (0.36 - 3.85)	0.07	0.79	1	25
AHDB9971	4	12		127 (104 - 150)d	3.49 (1.27 - 9.61)	5.86	0.015	1	25
AHDB9736	4	16		129 (104 - 153)ad	2.31 (0.79 - 6.75)	2.33	0.127	1	25

Nymph batch 11 - surface residue

Treatment	% Mortality at 1hpi ^a	% Mortality at 24hpi ^a	Factors	MST ^b (95% CI)	HR ^c (95% CI)	Z (HR)	P (HR)	df	n
Control	0	0	Treatment	160 (149 - 172)		49.02	<0.001	6	7
Pyrethrum 5EC	24	60		53 (31 - 76)	18.09 (6.21 - 52.67)	28.19	<0.001	1	25
Spruzit	12	24		115 (88 - 143)	4.18 (1.35 - 12.96)	6.13	0.013	1	25
AHDB9967	12	12		148 (126 - 170)	3.45 (1.12 - 10.57)	4.68	0.03	1	25
AHDB9735	0	4		162 (151 - 174)	4.88 (1.67 - 14.26)	8.36	0.004	1	25
AHDB9971	0	4		162 (151 - 174)	3.66 (1.21 - 11.02)	5.31	0.021	1	25
AHDB9736	4	8		155 (138 - 173)	4.31 (1.45 - 12.81)	6.91	0.009	1	25

c. Kaplan-Meier pair wise comparisons

Adult batch 1 - topical application

Treatment	1		2		3		4		5		6		7	
	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.
Log Rank	1		45.231	0.000	18.662	0.000	9.334	0.002	11.079	0.001	11.752	0.001	13.731	0.000
(Mantel-Cox)	2	45.231	0.000		19.056	0.000	41.741	0.000	30.032	0.000	32.667	0.000	25.242	0.000
	3	18.662	0.000	19.056	0.000		9.375	0.002	5.325	0.021	4.720	0.030	2.218	0.136
	4	9.334	0.002	41.741	0.000	9.375	0.002		0.546	0.460	0.078	0.780	2.714	0.099
	5	11.079	0.001	30.032	0.000	5.325	0.021	0.546	0.460		0.695	0.405	0.828	0.363
	6	11.752	0.001	32.667	0.000	4.720	0.030	0.078	0.780	0.695	0.405		2.221	0.136
	7	13.731	0.000	25.242	0.000	2.218	0.136	2.714	0.099	0.828	0.363	2.221	0.136	

Adult batch 2 - surface residue

Treatment	1		2		3		4		5		6		7	
	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.
Log Rank	1		43.940	0.000	28.406	0.000	13.945	0.000	35.369	0.000	0.993	0.319	20.469	0.000
(Mantel-Cox)	2	43.940	0.000		1.803	0.179	25.411	0.000	9.292	0.002	35.583	0.000	16.216	0.000
	3	28.406	0.000	1.803	0.179		8.955	0.003	0.945	0.331	22.396	0.000	4.416	0.036
	4	13.945	0.000	25.411	0.000	8.955	0.003		5.650	0.017	10.487	0.001	0.591	0.442
	5	35.369	0.000	9.292	0.002	0.945	0.331	5.650	0.017		25.600	0.000	2.768	0.096
	6	0.993	0.319	35.583	0.000	22.396	0.000	10.487	0.001	25.600	0.000		15.378	0.000
	7	20.469	0.000	16.216	0.000	4.416	0.036	0.591	0.442	2.768	0.096	15.378	0.000	

Adult batch 3 - topical application

Treatment	1		2		3		4		5		6		7	
	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.
Log Rank	1		27.649	0.000	16.195	0.000	0.692	0.406	0.018	0.895	4.593	0.032	2.219	0.136
(Mantel-Cox)	2	27.649	0.000		9.880	0.002	19.805	0.000	24.660	0.000	15.621	0.000	14.905	0.000
	3	16.195	0.000	9.880	0.002		9.478	0.002	12.461	0.000	5.203	0.023	5.312	0.021
	4	0.692	0.406	19.805	0.000	9.478	0.002		0.531	0.466	1.749	0.186	0.446	0.504
	5	0.018	0.895	24.660	0.000	12.461	0.000	0.531	0.466		3.580	0.058	1.799	0.180
	6	4.593	0.032	15.621	0.000	5.203	0.023	1.749	0.186	3.580	0.058		0.325	0.569
	7	2.219	0.136	14.905	0.000	5.312	0.021	0.446	0.504	1.799	0.180	0.325	0.569	

Adult batch 3 - surface residue

Treatment	1		2		3		4		5		6		7	
	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.
Log Rank	1		5.697	0.017	0.076	0.783	3.349	0.067	0.636	0.425	0.007	0.934	0.010	0.920
(Mantel-Cox)	2	5.697	0.017		4.533	0.033	0.340	0.560	3.520	0.061	5.589	0.018	6.489	0.011
	3	0.076	0.783	4.533	0.033		2.299	0.129	0.271	0.603	0.132	0.716	0.148	0.701
	4	3.349	0.067	0.340	0.560	2.299	0.129		1.854	0.173	3.428	0.064	3.907	0.048
	5	0.636	0.425	3.520	0.061	0.271	0.603	1.854	0.173		0.596	0.440	0.872	0.351
	6	0.007	0.934	5.589	0.018	0.132	0.716	3.428	0.064	0.596	0.440		0.000	0.986
	7	0.010	0.920	6.489	0.011	0.148	0.701	3.907	0.048	0.872	0.351	0.000	0.986	

Adult batch 4 - topical application

Treatment	1		2		3		4		5		6		7	
	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.
Log Rank	1		35.286	0.000	0.036	0.850	0.081	0.777	1.982	0.159	0.118	0.731	1.272	0.259
(Mantel-Cox)	2	35.286	0.000		35.286	0.000	23.400	0.000	26.000	0.000	35.286	0.000	39.000	0.000
	3	0.036	0.850	35.286	0.000		0.059	0.808	0.752	0.386	0.153	0.696	0.854	0.356
	4	0.081	0.777	23.400	0.000	0.059	0.808		0.662	0.416	0.284	0.594	1.167	0.280
	5	1.982	0.159	26.000	0.000	0.752	0.386	0.662	0.416		2.646	0.104	5.899	0.015
	6	0.118	0.731	35.286	0.000	0.153	0.696	0.284	0.594	2.646	0.104		0.460	0.498
	7	1.272	0.259	39.000	0.000	0.854	0.356	1.167	0.280	5.899	0.015	0.460	0.498	

Adult batch 4 - surface residue

Treatment	1		2		3		4		5		6		7		
	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	
Log Rank (Mantel-Cox)	1		12.365	0.000	1.195	0.274	3.992	0.046	1.195	0.274	0.083	0.773	1.757	0.185	
	2	12.365	0.000			6.768	0.009	2.548	0.110	6.768	0.009	9.306	0.002	14.283	0.000
	3	1.195	0.274	6.768	0.009			0.964	0.326	0.000	1.000	1.189	0.276	4.013	0.045
	4	3.992	0.046	2.548	0.110	0.964	0.326			0.964	0.326	3.311	0.069	6.925	0.009
	5	1.195	0.274	6.768	0.009	0.000	1.000	0.964	0.326			1.189	0.276	4.013	0.045
	6	0.083	0.773	9.306	0.002	1.189	0.276	3.311	0.069	1.189	0.276			0.798	0.372
	7	1.757	0.185	14.283	0.000	4.013	0.045	6.925	0.009	4.013	0.045	0.798	0.372		

Adult batch 5 - topical application

Treatment	1		2		3		4		5		6		7		
	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	
Log Rank (Mantel-Cox)	1		42.875	0.000	5.186	0.023	1.654	0.198	2.634	0.105	1.657	0.198	0.224	0.636	
	2	42.875	0.000			22.200	0.000	26.606	0.000	35.914	0.000	38.936	0.000	43.528	0.000
	3	5.186	0.023	22.200	0.000			0.948	0.330	1.352	0.245	1.780	0.182	6.512	0.011
	4	1.654	0.198	26.606	0.000	0.948	0.330			0.027	0.870	0.015	0.902	2.636	0.104
	5	2.634	0.105	35.914	0.000	1.352	0.245	0.027	0.870			0.081	0.776	3.599	0.058
	6	1.657	0.198	38.936	0.000	1.780	0.182	0.015	0.902	0.081	0.776			2.646	0.104
	7	0.224	0.636	43.528	0.000	6.512	0.011	2.636	0.104	3.599	0.058	2.646	0.104		

Adult batch 5 - surface residue

Treatment	1		2		3		4		5		6		7	
	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.
Log Rank	1		41.912	0.000	29.718	0.000	3.642	0.056	2.998	0.083	0.169	0.681	1.828	0.176
(Mantel-Cox)	2	41.912	0.000		4.977	0.026	19.037	0.000	28.556	0.000	24.344	0.000	25.286	0.000
	3	29.718	0.000	4.977	0.026		9.567	0.002	16.889	0.000	15.067	0.000	14.412	0.000
	4	3.642	0.056	19.037	0.000	9.567	0.002		0.191	0.662	1.319	0.251	0.317	0.574
	5	2.998	0.083	28.556	0.000	16.889	0.000	0.191	0.662		0.714	0.398	0.030	0.863
	6	0.169	0.681	24.344	0.000	15.067	0.000	1.319	0.251	0.714	0.398		0.474	0.491
	7	1.828	0.176	25.286	0.000	14.412	0.000	0.317	0.574	0.030	0.863	0.474	0.491	

Adult batch 6 - topical application

Treatment	1		2		3		4		5		6		7	
	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.
Log Rank	1		31.315	0.000	8.599	0.003	1.588	0.208	0.151	0.698	0.127	0.721	2.433	0.119
(Mantel-Cox)	2	31.315	0.000		12.350	0.000	19.250	0.000	35.856	0.000	33.577	0.000	25.097	0.000
	3	8.599	0.003	12.350	0.000		2.455	0.117	11.158	0.001	8.293	0.004	3.221	0.073
	4	1.588	0.208	19.250	0.000	2.455	0.117		2.755	0.097	1.115	0.291	0.007	0.935
	5	0.151	0.698	35.856	0.000	11.158	0.001	2.755	0.097		0.671	0.413	4.284	0.038
	6	0.127	0.721	33.577	0.000	8.293	0.004	1.115	0.291	0.671	0.413		1.929	0.165
	7	2.433	0.119	25.097	0.000	3.221	0.073	0.007	0.935	4.284	0.038	1.929	0.165	

Nymph batch 7 - topical application

Treatment	1		2		3		4		5		6		7	
	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.
Log Rank	1		6.422	0.011	4.523	0.033	1.321	0.250	1.295	0.255	0.197	0.657	0.001	0.971
(Mantel-Cox)	2	6.422	0.011		0.071	0.789	1.933	0.164	2.076	0.150	4.332	0.037	5.793	0.016
	3	4.523	0.033	0.071	0.789		1.299	0.254	1.322	0.250	3.061	0.080	4.426	0.035
	4	1.321	0.250	1.933	0.164	1.299	0.254		0.000	0.982	0.497	0.481	1.224	0.269
	5	1.295	0.255	2.076	0.150	1.322	0.250	0.000	0.982		0.475	0.490	1.178	0.278
	6	0.197	0.657	4.332	0.037	3.061	0.080	0.497	0.481	0.475	0.490		0.168	0.682
	7	0.001	0.971	5.793	0.016	4.426	0.035	1.224	0.269	1.178	0.278	0.168	0.682	

Nymph batch 7 - surface residue

Treatment	1		2		3		4		5		6		7	
	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.
Log Rank	1		37.433	0.000	13.967	0.000	13.896	0.000	5.440	0.020	5.448	0.020	3.126	0.077
(Mantel-Cox)	2	37.433	0.000		6.070	0.014	9.727	0.002	23.684	0.000	18.836	0.000	28.064	0.000
	3	13.967	0.000	6.070	0.014		0.100	0.752	4.204	0.040	3.214	0.073	6.731	0.009
	4	13.896	0.000	9.727	0.002	0.100	0.752		3.648	0.056	2.672	0.102	6.494	0.011
	5	5.440	0.020	23.684	0.000	4.204	0.040	3.648	0.056		0.024	0.877	0.575	0.448
	6	5.448	0.020	18.836	0.000	3.214	0.073	2.672	0.102	0.024	0.877		0.705	0.401
	7	3.126	0.077	28.064	0.000	6.731	0.009	6.494	0.011	0.575	0.448	0.705	0.401	

Nymph batch 8 - topical application

Treatment	1		2		3		4		5		6		7	
	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.
Log Rank	1		19.402	0.000	3.755	0.053	0.043	0.836	0.038	0.845	0.145	0.703	0.675	0.411
(Mantel-Cox)	2	19.402	0.000		6.899	0.009	18.104	0.000	17.933	0.000	17.797	0.000	24.848	0.000
	3	3.755	0.053	6.899	0.009		3.722	0.054	3.279	0.070	2.900	0.089	7.518	0.006
	4	0.043	0.836	18.104	0.000	3.722	0.054		0.199	0.655	0.405	0.525	0.263	0.608
	5	0.038	0.845	17.933	0.000	3.279	0.070	0.199	0.655		0.032	0.859	1.099	0.294
	6	0.145	0.703	17.797	0.000	2.900	0.089	0.405	0.525	0.032	0.859		1.590	0.207
	7	0.675	0.411	24.848	0.000	7.518	0.006	0.263	0.608	1.099	0.294	1.590	0.207	

Nymph batch 8 - surface residue

Treatment	1		2		3		4		5		6		7	
	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.
Log Rank	1		26.061	0.000	29.499	0.000	7.860	0.005	8.737	0.003	21.324	0.000	10.258	0.001
(Mantel-Cox)	2	26.061	0.000		1.310	0.252	6.505	0.011	8.435	0.004	0.317	0.574	4.363	0.037
	3	29.499	0.000	1.310	0.252		11.988	0.001	17.866	0.000	4.940	0.026	10.661	0.001
	4	7.860	0.005	6.505	0.011	11.988	0.001		0.018	0.892	4.095	0.043	0.180	0.671
	5	8.737	0.003	8.435	0.004	17.866	0.000	0.018	0.892		6.154	0.013	0.412	0.521
	6	21.324	0.000	0.317	0.574	4.940	0.026	4.095	0.043	6.154	0.013		2.329	0.127
	7	10.258	0.001	4.363	0.037	10.661	0.001	0.180	0.671	0.412	0.521	2.329	0.127	

Nymph batch 9 - topical application

Treatment	1		2		3		4		5		6		7	
	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.
Log Rank 1			23.802	0.000	27.193	0.000	0.004	0.951	0.046	0.830	0.000	0.990	0.066	0.797
(Mantel-Cox) 2	23.802	0.000			2.904	0.088	27.064	0.000	25.284	0.000	25.365	0.000	25.239	0.000
3	27.193	0.000	2.904	0.088			31.727	0.000	32.397	0.000	28.559	0.000	29.466	0.000
4	0.004	0.951	27.064	0.000	31.727	0.000			0.055	0.815	0.004	0.950	0.105	0.745
5	0.046	0.830	25.284	0.000	32.397	0.000	0.055	0.815			0.037	0.847	0.005	0.941
6	0.000	0.990	25.365	0.000	28.559	0.000	0.004	0.950	0.037	0.847			0.069	0.792
7	0.066	0.797	25.239	0.000	29.466	0.000	0.105	0.745	0.005	0.941	0.069	0.792		

Nymph batch 9 - surface residue

Treatment	1		2		3		4		5		6		7	
	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.
Log Rank 1			43.391	0.000	42.466	0.000	2.933	0.087	0.000	0.994	1.882	0.170	3.601	0.058
(Mantel-Cox) 2	43.391	0.000			0.009	0.925	28.480	0.000	43.674	0.000	33.053	0.000	30.934	0.000
3	42.466	0.000	0.009	0.925			28.886	0.000	43.024	0.000	32.375	0.000	29.727	0.000
4	2.933	0.087	28.480	0.000	28.886	0.000			2.998	0.083	0.155	0.694	0.008	0.928
5	0.000	0.994	43.674	0.000	43.024	0.000	2.998	0.083			1.901	0.168	3.682	0.055
6	1.882	0.170	33.053	0.000	32.375	0.000	0.155	0.694	1.901	0.168			0.263	0.608
7	3.601	0.058	30.934	0.000	29.727	0.000	0.008	0.928	3.682	0.055	0.263	0.608		

Nymph batch 10 - topical application

Treatment	1		2		3		4		5		6		7	
	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.
Log Rank 1			23.460	0.000	30.523	0.000	1.285	0.257	4.255	0.039	1.125	0.289	2.334	0.127
(Mantel-Cox) 2	23.460	0.000			0.091	0.763	17.832	0.000	12.018	0.001	18.418	0.000	12.587	0.000
3	30.523	0.000	0.091	0.763			23.273	0.000	14.133	0.000	24.936	0.000	14.585	0.000
4	1.285	0.257	17.832	0.000	23.273	0.000			1.102	0.294	0.014	0.907	0.305	0.581
5	4.255	0.039	12.018	0.001	14.133	0.000	1.102	0.294			1.293	0.256	0.170	0.680
6	1.125	0.289	18.418	0.000	24.936	0.000	0.014	0.907	1.293	0.256			0.356	0.551
7	2.334	0.127	12.587	0.000	14.585	0.000	0.305	0.581	0.170	0.680	0.356	0.551		

Nymph batch 10 - surface residue

Treatment	1		2		3		4		5		6		7	
	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.
Log Rank 1			22.472	0.000	3.531	0.060	0.860	0.354	0.186	0.666	0.154	0.695	0.100	0.752
(Mantel-Cox) 2	22.472	0.000			7.500	0.006	14.984	0.000	27.936	0.000	23.584	0.000	24.923	0.000
3	3.531	0.060	7.500	0.006			0.972	0.324	5.459	0.019	2.787	0.095	4.862	0.027
4	0.860	0.354	14.984	0.000	0.972	0.324			1.904	0.168	0.373	0.542	1.529	0.216
5	0.186	0.666	27.936	0.000	5.459	0.019	1.904	0.168			0.773	0.379	0.014	0.907
6	0.154	0.695	23.584	0.000	2.787	0.095	0.373	0.542	0.773	0.379			0.460	0.497
7	0.100	0.752	24.923	0.000	4.862	0.027	1.529	0.216	0.014	0.907	0.460	0.497		

Nymph batch 11 - topical application

Treatment	1		2		3		4		5		6		7	
	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.
Log Rank	1		49.000	0.000	48.450	0.000	10.702	0.001	0.076	0.783	8.095	0.004	2.755	0.097
(Mantel-Cox)	2	49.000	0.000		17.216	0.000	32.667	0.000	45.231	0.000	45.231	0.000	45.231	0.000
	3	48.450	0.000	17.216	0.000		22.883	0.000	44.617	0.000	33.034	0.000	33.992	0.000
	4	10.702	0.001	32.667	0.000	22.883	0.000		9.963	0.002	0.249	0.618	2.674	0.102
	5	0.076	0.783	45.231	0.000	44.617	0.000	9.963	0.002		7.097	0.008	1.893	0.169
	6	8.095	0.004	45.231	0.000	33.034	0.000	0.249	0.618	7.097	0.008		1.217	0.270
	7	2.755	0.097	45.231	0.000	33.992	0.000	2.674	0.102	1.893	0.169	1.217	0.270	

Nymph batch 11 - surface residue

Treatment	1		2		3		4		5		6		7	
	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.
Log Rank	1		39.891	0.000	6.716	0.010	6.385	0.012	16.407	0.000	8.336	0.004	11.517	0.001
(Mantel-Cox)	2	39.891	0.000		14.309	0.000	23.287	0.000	28.049	0.000	30.040	0.000	25.236	0.000
	3	6.716	0.010	14.309	0.000		0.122	0.726	0.301	0.583	0.103	0.749	0.037	0.848
	4	6.385	0.012	23.287	0.000	0.122	0.726		2.175	0.140	0.051	0.821	0.718	0.397
	5	16.407	0.000	28.049	0.000	0.301	0.583	2.175	0.140		2.001	0.157	0.398	0.528
	6	8.336	0.004	30.040	0.000	0.103	0.749	0.051	0.821	2.001	0.157		0.494	0.482
	7	11.517	0.001	25.236	0.000	0.037	0.848	0.718	0.397	0.398	0.528	0.494	0.482	



Certificate of

Official Recognition of Efficacy Testing Facilities or Organisations in the United Kingdom

This certifies that

Warwick Crop Centre, School of Life Sciences

complies with the minimum standards laid down in
Regulation (EC) 1107/2009 for efficacy testing.

The above Facility/Organisation has been officially
recognised as being competent to carry out efficacy trials/tests
in the United Kingdom in the following categories:

**Agriculture/Horticulture
Biologicals and Semiochemicals**

Date of issue: **6 October 2017**

Effective date: **20 March 2017**

Expiry date: **19 March 2022**

Signature

Aislin Richardson
Authorised signatory

Certification Number

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